

Flagstaff Watershed Protection Project

Scenery Report

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for:
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Coconino National Forest

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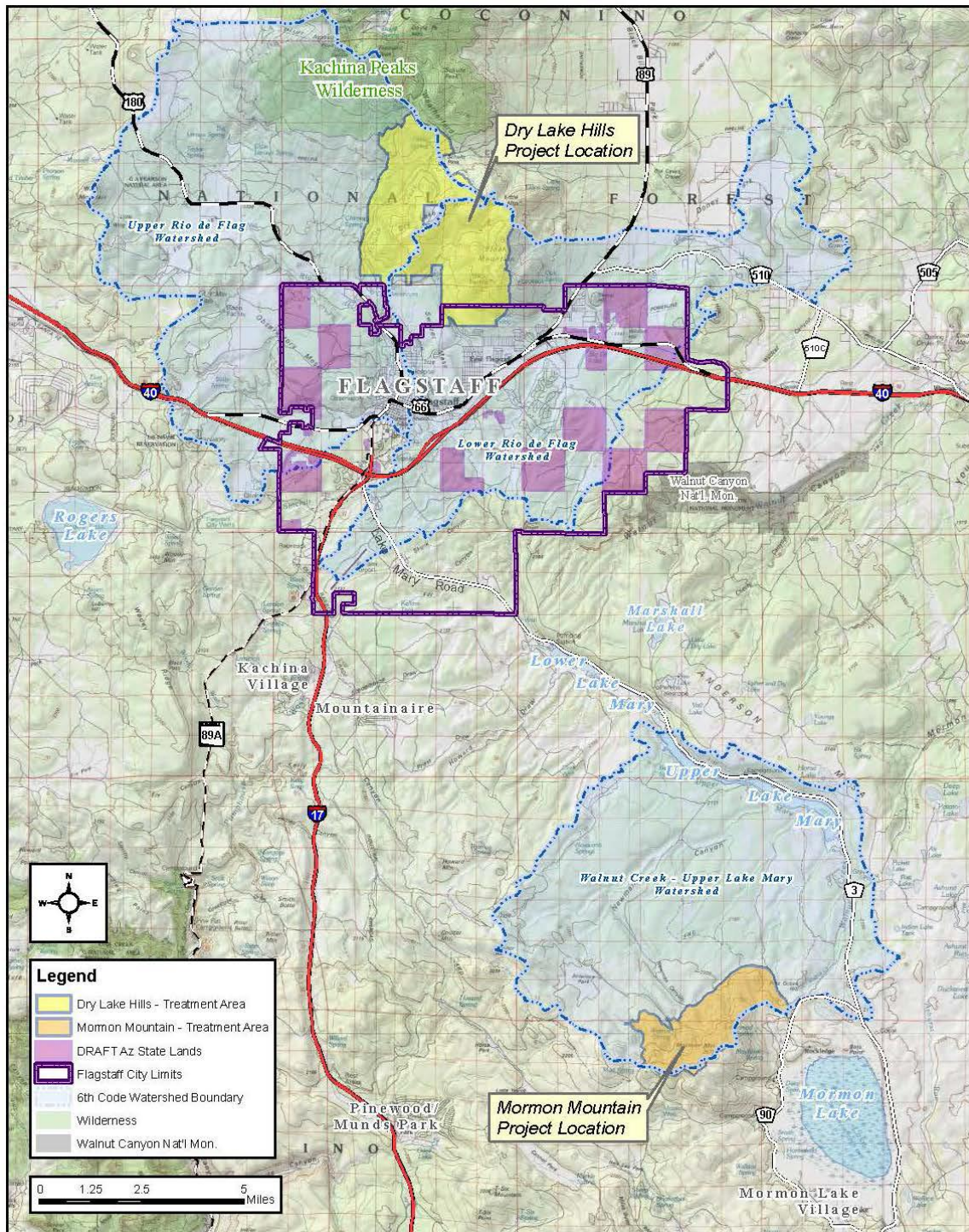
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Introduction

The Flagstaff Watershed Protection Project (FWPP) will evaluate and disclose the effects of using mechanical thinning and prescribed burning on the National Forest to reduce the threat of high severity wildfire and subsequent flooding in two key areas near the City of Flagstaff, Arizona: the Dry Lake Hills portion of the Rio de Flag Watershed north of Flagstaff, and the Mormon Mountain portion of the Upper Lake Mary Watershed south of Flagstaff (**Error! Reference source not found.**).

Figure 1: Flagstaff Watershed Protection Project Location



This report documents the effects of the proposed vegetation thinning and prescribed fire treatments on the scenic resources located within the approximately 7,500 acres in the Dry Lake Hills portion and almost 3,000 acres in the Mormon Mountain portion.

Regulatory Requirements

All alternatives are designed to guide the Coconino National Forest's management activities in meeting all applicable Federal and State laws, regulations, and policies.

Applicable Laws

The National Environmental Policy Act of 1969 (NEPA) states:

“(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.”

To accomplish this, numerous federal laws require all Federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring. These Federal laws include the following:

The Environmental Quality Act (1970) – This act sets forth a national policy for the environment that provides for the enhancement of environmental quality.

The Forest and Rangeland Renewable Resources Planning Act (1974) – This act provides direction to conduct aesthetic analysis and assess the impacts on aesthetics for timber harvesting. It also provides the framework for natural resource conservation.

The National Forest Management Act (1976) – This act provides direction that the preservation of aesthetic values is analyzed at all planning levels. Part 219.21 requires that the visual resource shall be inventoried and evaluated as an integrated part of evaluating alternatives in the forest planning process, addressing both the landscape's visual attractiveness and the public's visual expectation.

Resources Planning Act (RPA) includes direction to: "...cut blocks, patches, or strips are shaped to the extent practicable with the natural terrain;...consistent with the protection of...aesthetic resources."

In addition, the Forest Service has routinely included scenery as part of the 1960 Multiple Use-Sustained Yield Act.

Policy

FSH 1909.13.13a, Chapter 10: "When pertinent to the issues...the Scenery Management System (SMS) should be used to describe...desired conditions and objectives."

FSH 1909.13.2.3: "...Also, see FSM 2380.61 for landscape aesthetics guidance."

FSM 2380.43.5 "Ensure application of the principles of landscape aesthetics, scenery management, and environmental design in project level planning"

FSM 2380.61 "Refer to the following publications in the Department of Agriculture's National Forest Landscape Management Series for technical guidance in managing landscape aesthetics and scenery." The pertinent publication is USDA Ag Handbook 701, "Landscape Aesthetics: A Handbook for Scenery Management". This Handbook directs identification of Desired Scenic Character (page 1-3 and 5-5), as does its most recent update "Appendix J Recommended SMS Refinements" 2007, and the "Region 5 SMS Implementation Process" 5/2009.

FSM 2020.5 "Sustainability. Meeting needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple-use and sustained-yield (FSM 1905)."

The following USDA handbooks establish a framework for management of scenic resources. These handbooks were written when the visual management system (VMS) was in place. Although the VMS has now been replaced by the scenery management system, the handbooks still apply to management of scenic resources.

National Forest Landscape Management Volume 1. Agriculture Handbook 434: 1973

Roads, Chapter 4, Agriculture Handbook 483: 1977

Timber, Chapter 5, Agriculture Handbook 559: 1980

Fire, Chapter 6, Agriculture Handbook 608: 1985

Recreation, Chapter 8, Agriculture Handbook 666: 1987

Landscape Aesthetics, A Handbook for Scenery Management, Agriculture Handbook 701: revised 2000.

Forest Service manual direction provides further clarification to utilize the Scenery Management System in forest and project planning and implementation, including sections 2380.3, 2382, and 2382.3:

2380.3, Policy: It is Forest Service policy to:

Inventory, evaluate, manage, and, where necessary, restore scenery as a fully integrated part of the ecosystems of National Forest System lands and of the land and resource management and planning process.

Employ a systematic, interdisciplinary approach to scenery management to ensure the integrated use of the natural and social sciences and environmental design.

Ensure scenery is treated equally with other resources.

Apply scenery management principles routinely in all National Forest System activities.

2382, Scenery Management: Managing scenery on National Forest System lands entails:

1. Completing and maintaining an inventory of landscape aesthetics and scenery resources.
Establishing goals and objectives for the management of scenery on all National Forest System lands.

2382.3 - Forest Plan Revisions and Scenery Management System

Update the scenery inventory using the Scenery Management System in Agriculture Handbook 701 (FSM 2380.61, para. 2). The recommended timeframe for updating the scenery inventory is prior to or at initiation of Forest land and resource management plan revisions.

Error! Reference source not found. summarizes the existing Forest Management Plan direction. It is followed by the proposed Revised Forest Management Plan direction

Table 1: Summary of the existing Forest Plan management direction for scenery (Forest Service 1987)

DESCRIPTION	Forest Plan Management Direction	FLMP page
Goals	Maintain and enhance visual resource values by including visual quality objectives in resource planning and management activities.	Replacement p.22
Forest-wide	Projects are planned to meet or exceed visual quality objectives (VQO). Review the VQO inventory as a part of project planning and make necessary corrections/refinements following field checking. Use VQO inventory to analyze impacts to VQO classes due to management activities such as timber sales, range projects, and firewood sales. Use the current Forest Visual Resource Management Inventory that lists VQO Forest-wide in conjunction with Forest Plan MA Map and descriptions to plan projects. Allow only one classification movement downward unless a larger movement is justified after doing an environmental analysis for emergency situations such as removal of fire damaged timber or I&DC control needs.	Replacement p.60
Forest-wide	...design timber management activities to integrate considerations for economics, water quality, soils, wildlife habitat, recreation opportunities, visual quality, and other	Replacement p.23

DESCRIPTION	Forest Plan Management Direction	FLMP page
	values.	
Ponderosa Pine and Mixed Conifer less than 40% slopes	Stand size, except managed old-growth stands, foreground Retention areas, or stands resulting from catastrophic events, such as wildfires or epidemic insect infestation, is between 10 and 100 acres unless larger or smaller stands are approved by the Forest Supervisor. Exceptions are stands managed for conversion to aspen and those managed as Gambel Oak nonindustrial wood, which can be as small as 5 acres and 1 acre, respectively and have maximum sizes of 10 and 40 acres, respectively. Also stands having a VQO of foreground Retention can be 2.5 acres. Stands are defined in the environmental documentation (ISM Phase IX) and documented in the timber sale project plan (ISM Phase X). Silvicultural treatments are designed to improve age class distribution within a 10K Block. The goal is to attain differences between adjacent timber stands by the time the first regeneration period is completed, which is when the seed trees are removed and the regenerated stand is certified, unless there is a specific management need, approved by the Forest Supervisor that delays achieving the goal. Progress towards the goal is made during each commercial entry. Manage to achieve, where possible, not more than one-quarter of a stand's perimeter in common with an adjacent stand whose characteristics do not meet minimums factors.	Replacement Pg. 129
Ponderosa Pine and Mixed Conifer less than 40% slopes	Timber stands managed to meet visual management objective (VQO) of foreground retention are managed as follows: Maintain or create a mosaic of stands of various sizes and age classes throughout the rotation. Obtain a stand of ponderosa pine and/or mixed conifer at maturity of 30 to 45 trees per acre. The average diameter of mature trees is 20 inches or greater. The large trees are maintained as long as possible. Extended rotations may be necessary. Allow naturally regenerated trees to stay if the overall visual quality objective is met. Obtain diversity of landscape management features. Created slash is promptly treated. Mistletoe treatments are designed to meet as many of these Standards as possible. Precommercial thinning is done as needed to meet the visual quality objectives.	Page 133
Ponderosa Pine and Mixed Conifer less than 40% slopes	Silvicultural Prescription in Foreground Retention Areas: <i>Uneven-Aged Management</i> – ☐ Uneven-aged stands have three or more distinct age classes present. The different aged trees are usually intermixed. Cutting methods are used that develop and maintain uneven-aged stands such as single-tree selection and group selection. Stands are entered on a 20-year cutting cycle and cut to a GSL of 100. Stand size is determined by the scale of the landscape, width of	Pg.133

DESCRIPTION	Forest Plan Management Direction	FLMP page
	the road, and the speed of the viewer (e.g., I-17 vs. 89A). Stand size may be less than 10 acres.	
Ponderosa Pine and Mixed Conifer less than 40% slopes	<p><i>Deferred Management</i></p> <p>☐ Deferred harvest management is used on stands that presently meet foreground Retention stand characteristics. These stands are managed by the uneven-aged management prescription when the stands no longer meet foreground Retention stand characteristics.</p> <p>Roads to be managed for foreground Retention within this MA and in MA 4 (other areas of foreground retention on the timber type are found in MA's 13 and 19):</p> <p>Road Miles (<i>only those in the treatment area are noted here</i>) Arizona Hwy 87 – 29, FH 3 - 46</p> <p>An average 300 feet on each side of the road will be managed as foreground Retention (nearly 20,000 acres) total from all MA's. Determine the exact width of the foreground Retention area after on-the-ground review.</p> <p>Foreground Partial Retention (VQO) Silvicultural Objectives are:</p> <p>☐ To maintain or create a mosaic of stands of various sizes and age classes throughout the rotation with a mature tree component (+18 inches d.b.h.) on at least 10 percent of the area.</p> <p>☐ Created slash will be treated.</p>	Pg.134
Unproductive Timber Land -	Visual Quality Objectives (VQO) are managed in accordance with the Forest-wide Standards and Guidelines	Pg.145
FLEA Area-Wide Goals and Objectives FLEA Area-Wide Guidelines	<p>There is a range of recreational setting opportunities for people to enjoy the area's many scenic and aesthetic qualities. Work towards a complete Scenery Management System (SMS) assessment.</p> <p>Provide fast clean-up from management activities and limit short-term visual impacts (1 to 3 years), while meeting fire potential reduction needs, design thinning for long-term scenic quality adjacent to homes and along major highways or near developed recreation sites.</p>	<p>Replacement Pg.206-62</p> <p>Replacement Pg.206-70</p>

The Coconino NF is in the process of revising its forest management plan. A review of the current draft (Forest Service 2013) includes the following information:

Ponderosa Pine Desired Conditions	<p>At landscape scale:</p> <p>1. Ponderosa Pine has a mosaic of trees with varying age classes and understory vegetation which provide habitat for a variety of species, including Mexican spotted owls and northern goshawks, and ground fuels conducive to low-severity fires.</p> <p>2. The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and climate variability that is similar to conditions prior to 1850 (pre-fire disruption¹⁷). The landscape is a functioning ecosystem that contains</p>	Pg. 52-54
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	<p>its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, and needle cast (e.g., fine fuels), and small trees maintain the natural fire regime. Organic ground cover and herbaceous vegetation provide 3 Frequent, low-severity fires (Fire Regime I) are characteristic in this PNVT, including throughout northern goshawk home ranges. Spatial heterogeneity and discontinuous crowns (interspaces between groups and single trees) prevents fire spread. Natural and human disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.</p> <p>4. At the landscape scale and as shown in table 9, Ponderosa Pine is composed of trees in structural stages that range from young to old and are dominated by ponderosa pine trees. Forest appearance is variable but generally uneven-aged and open; occasional areas of even-aged structure are present. Forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings of grasses, forbs, and shrubs that are similar to historic patterns. Openings typically range from 10 percent in more productive sites to 70 percent in the less productive sites. The size and shape of trees, number of trees per group, and number of groups per area are variable across the landscape. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms. protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.</p> <p>5. Ponderosa Pine is composed predominantly of <u>vigorous</u> trees, but <u>declining</u> trees are a component. Declining trees are well distributed across the landscape and may occur as clumps or individual trees. They provide for snags, top-killed, lightning-scarred and fire-scarred trees, and coarse woody debris (greater than 3-inch diameter, including large logs).</p> <p>6. Old growth structure occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Consistent with vegetative characteristics of a frequent, low severity fire regime, old growth is a component of uneven-aged forests, generally comprised of groups of similarly aged trees and single trees interspersed with open grass–forb–shrub interspaces, but occasionally, it occurs in larger even-aged patches where local microsites facilitate less frequent fire regimes. Within <u>group</u> variability may be low but variation among groups is typically high and proportions of patches with different developmental stages may vary depending on site-specific conditions. Old growth components include old trees, dead trees (snags), and dead and downed wood (coarse woody debris including large size classes). Snags and large dead and downed fuels are irregularly distributed across the landscape and may not exist in some patches. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).</p>	
Desired Conditions for	1. The scenic values of the Coconino NF are conserved and enhanced.	Pg. 113-114

Scenic Resources	<p>Visitors see that the forest is being actively managed through visual cues such as seeing firebreaks with native wildflowers, grasses, and forbs; some fire effects; and tree thinning to frame views from trails and developed recreation sites.</p> <p>2. Vegetation treatments contribute to the scenic integrity of the desired landscape character (see chapter 3, “Management Areas”), especially in highly sensitive areas. Management-created debris, such as slash along Concern Level 1 and 2 travel routes, are located and arranged to minimize their visual disturbance in the immediate foreground (up to 300 feet), and slash piles in that immediate foreground are not evident once they are burned or scattered. Openings and stand boundaries are naturally shaped and are oriented to contours and existing vegetation patterns to blend with existing landscape characteristics, except where other natural resource concerns require minimal treatment along powerline corridors.</p> <p>5. Long term soil and plant productivity, proper functioning ecosystems, and clean water are considered important components of scenic quality. Rock pits, borrow areas, open pit mines, and restored gullies have very low scenic integrity and are not seen from visually sensitive travelways and viewing points to the extent possible. Cultural and historic features, young cinder cones, and lava flows are recognized for their inherent scenic values. Native plant rehabilitation is carried out in disturbed areas to speed scenic quality recovery. Natural land forms and vegetation are used, to the extent possible, to screen facilities from important viewing locations such as scenic trails and byways.</p>	
Objectives for Scenic Resources	1. Rehabilitate at least 25,000 acres that do not meet the desired scenic integrity objective (SIO) by at least one level within 15 years of plan approval.	Pg. 114
Guidelines for Scenic Resources	<p>1. To maintain SIOs, management activities that are inconsistent with the SIO and whose effects persist in the long term should not occur unless a decision is made to change the SIO⁴⁴. Site-specific exceptions can be made based on lower site productivity, soil conditions, and climate without changing the SIO. Additional mitigation measures may be needed in these cases.</p> <p>2. To maintain consistency with the Scenery Management System in the long-term:</p> <ul style="list-style-type: none"> • Deviations⁴⁵ in areas with high SIO should not be evident even if they are present. • Deviations in areas with moderate SIO should be allowed but remain visually subordinate to the landscape being viewed. • Deviations in areas with low SIO should borrow valued attributes from the landscape being viewed, even though the deviations may begin to dominate the views. <p>4. Visually attractive live and dead trees, some large woody debris, and understory shrubs foreground (half a mile or less) should be favored when leaving vegetation in the of Concern Level 1 and 2 travel routes in order to enhance the desired landscape character.</p> <p>5 Stems should be flush cut, if possible, or cut less than 6 inches above</p>	Pg. 114

	<p>ground (uphill side) in the immediate foreground (300 feet or less) of Concern Level 1 and 2 travel routes where topography and operational safety allows in order to minimize the scenic impact of management activities.</p> <p>6. When possible, new log landings, roads, and designated skid trails should be located out of view of Concern Level 1 and 2 travel routes to avoid observation of bare mineral soil. When avoiding these locations is not possible, the evidence of these activities should be restored following completion of the activity to harmonize with the surrounding landscape.</p> <p>7. To minimize disruption of the visual landscape, straight lines and geometric shapes should be avoided at the edges of openings and stand boundaries.</p> <p>8. Evidence of fire activities should be dominant for no more than 3 years after burning in areas of high scenic integrity and 5 years in moderate scenic integrity in order to maintain SIOs.</p>	
<p>Desired Conditions for Pine Belt Management Area Scenery – Desired Landscape Character</p>	<p>1. The Pine Belt MA itself is flat to gently sloping with scattered, steeper landforms including Mormon Mountain, lands around Kendrick Peak, the West Clear Creek drainage, Walnut Canyon, Pumphouse Wash, Fry Canyon, Saddle Mountain, a number of prominent hills and mountains in the northern portion of the management area and various escarpments throughout. On the northern end, evidence of volcanic geology is more common.</p> <p>2. This area is valued for its continuous stands of uneven-aged ponderosa pine, old-growth “yellow-belly” ponderosa pine stands, and beautiful lakes for boating and fishing. This management area is comprised of Ponderosa Pine and Piñon-Juniper Woodlands vegetation types which cluster around broad expanses of grassy openings and picturesque lakes. Ponderosa pine is all-aged and includes large trees with open, well-formed crowns. The forest is generally open and park like with a diverse understory of grasses and shrubs. Tree conditions in places such as north-facing slopes and canyon bottoms are sometimes more dense. The distribution and class of trees across the landscape corresponds with the ecological desired conditions for this vegetation type. Old growth ponderosa pines as groups or as individual specimens provide a valued landscape feature that adds to the sense of diversity and discovery in this zone. Snags, top-killed trees, down logs, and other evidence of fire and wind disturbance occur individually and in patches of varying sizes. They provide an intriguing feature whose distribution on the landscape varies over time. Standing dead trees provide character and wildlife habitat and some are retained (see the desired conditions for the ponderosa pine vegetation type for more information).</p> <p>4. Gambel oak and aspen provide a desirable visual contrast to the evergreen pine in fall. In winter, this management area provides recreationists a white, snow-covered landscape that contrasts with evergreen trees. In the summer, it provides cool shady areas for a variety of recreation activities. Arizona walnut trees in Walnut Canyon provide a valued scenic feature in this management area that</p>	Pg. 119-120

	contributes an interesting bark and texture against the winter sky and yellow fall color.	
San Francisco Peaks Management Area Scenery – Desired Landscape Character (also apply to Fort Valley/Mount Elden MA and Pine Belt MA)	2. Vegetation varies along the elevation gradient from open ponderosa pine stands with views of the surrounding landscape to sun-dappled shade of Spruce-Fir and Mixed Conifer to rocky and sparsely vegetated alpine communities. Within these vegetation types, steep, cool drainages, and fire disturbance create microclimates with a surprising diversity of landscape features such as high elevation mountain meadows, communities of bristlecone pine, and aspen that contrast with dark evergreen surroundings. Aspen and grasslands, in particular, create openings that provide a sense of the surrounding landscape. The lower slopes of this MA gradually flatten and blend into the surrounding plateau.	Pg. 121
Flagstaff Neighborhoods Management Area Scenery	1. Natural landscape is highly valued by local residents and visitors. National Forest System lands provide the backdrop for the community's character while accommodating features that are more typical of an urban or rural setting. Infrastructure and developments that serve a broad public interest are sometimes evident but still subordinate to the landscape. Recreation developments contribute to the area's unique sense of place through use of native materials; mimicking line, form, color, and texture of the surrounding landscape; or use of identifiable Forest Service symbols and historic features.	Pg. 123

Methodology

This evaluation applies current National Forest Scenery Management methodology in conjunction with existing Coconino Forest Land and Resource Management Plan (LRMP) direction. This analysis relies on field studies and photography from the treatment area, as well as coordination with project interdisciplinary team members, and consideration of public preferences for scenery. Cumulative scenic quality was within the geographic scope of scenic attributes and landscape character in the ponderosa pine and mixed conifer forests of the Coconino National Forest.

Integration of this scenery analysis assures the Flagstaff Watershed Protection Project (FWPP) is consistent with scenery-related CNF LRMP direction, USFS policies, and applicable elements of USFS Visual Management and Scenery Management systems. Refer to Appendix B of the SMS Handbook #701 for a complete list of references requiring Forest Service management of scenery and aesthetics (Forest Service 2000).

The project would help achieve the desired conditions for scenery as defined in the Coconino LRMP (Forest Service 1987): “Maintain and enhance visual resource values by including visual quality objectives in resource planning and management activities.”

Visual Management System (VMS)

Currently the scenery resources of Coconino National Forest (CNF) are managed through the application of the VMS. The VMS was adopted by the Forest Service in 1974. The culmination of the VMS were Visual Quality Objectives (VQOs) prescribed in the LRMP for all lands within CNF. The VQO classifications range from Preservation, Retention, Partial Retention, Modification, to Maximum Modification. For a full synopsis of each VQO see *National Forest*

Landscape Management: Volume 2, Chapter 1, The Visual Management System (Forest Service 1975).

The CNF LRMP is currently being revised and will be transitioning to Scenery Management System (see next section). For this project, the updated SMS inventory for the CNF will be incorporated and integrated at a project scale until Forest Plan Revision is completed. This action follows existing CNF Forest Plan direction “*Review the VQO inventory as a part of project planning and make necessary corrections/refinements following field checking* (USDA-Forest Service 2000). It also follows Forest Service direction “*begin using the concepts and terms contained in this Handbook (Landscape Aesthetics, A Handbook for Scenery Management) as you work on new projects or initiate forest plan revisions*” (Forest Service 2000).

Scenery Management System (SMS)

The VMS process has been updated in the Scenery Management System (SMS). Handbook direction outlining the inventory and transition process from VMS to SMS may be found in *Landscape Aesthetics: A Handbook for Scenery Management* (Forest Service 2000). Full adoption of the SMS is to occur as each National Forest revises its LRMP. For Forests not currently undergoing the LRMP revision process, or for those requiring extensive time for revision, application of the SMS will occur at the project level. This is the case for the Coconino NF.

Scenic Integrity Objectives (SIOs) are used in the SMS in much the same way as VQOs are used in VMS. The Scenic Integrity or "intactness" of national forest lands is the means by which proposed alterations to the land are evaluated. Scenic Integrity is produced from the combined inventory of scenic attractiveness, viewing distance from the observer, and concern level of forest visitors. Scenic Integrity Objectives (SIO) are established for the forest and can be applied at the forest, management area or treatment area (USDA-Forest Service 2000). SIOs range from Very High, meaning the landscape character is unaltered, to Very Low, meaning the landscape character is highly altered. Intermediate levels include High (landscape character appears unaltered), Moderate (landscape character is slightly altered), and Low (landscape character is moderately altered). Another basic premise of the SMS is landscape character, which gives a geographic area its visual and cultural image. It consists of a combination of physical, biological and cultural attributes that make each landscape identifiable and unique. Landscape character embodies distinct landscape attributes that exist throughout an area (Forest Service 2000). Table 2 compares the Visual Management System rankings and terminology with the Scenery Management System.

Table 2 Scenic integrity-visual quality and perception crosswalk (Forest Service 2000)

Scenic Integrity (both Existing and Objective)	Visual Quality Objective	The Forest's Scenic Integrity as people perceive it
Very High	Preservation	Unaltered; landscape character is intact
High	Retention	Appears unaltered; deviations to landscape character are not evident
Moderate	Partial Retention	Slightly altered; deviations are subordinate to landscape character being viewed
Low	Modification	Moderately altered; deviations begin to dominate the valued landscape character being viewed
Very Low	Maximum Modification	Appears heavily altered; deviations may strongly dominate the valued landscape character.

Unacceptably Low	Unacceptable Modification	Appears extremely altered; this level is only used to inventory existing scenic integrity. It is never an objective on National Forest System lands.
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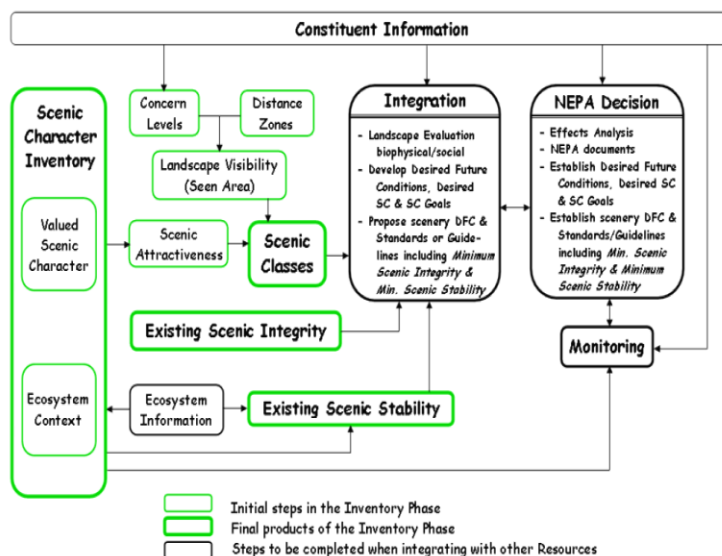
Analysis Process

The FWPP project is being planned as a large scale fuels reduction project with activities planned on about 8,000 acres on the Flagstaff Ranger Districts of the Coconino NF. The proposed activities and type of the project make it an appropriate candidate for SMS refinements for managing and sustaining scenic quality within an ecosystem management context.

The purpose and need of this analysis is focused on fuels reduction. SMS Appendix J (USDA-Forest Service 2007) recognizes that disturbances across the landscape can be beneficial, and even critically important to forest health and sustainability, but they can also have detrimental impacts to scenery. Appendix J approaches landscape assessments by replacing corresponding sections within *Chapter 2 – Scenic Integrity*, and refines and supplements parts of *Chapter 1 – Landscape Character*, *Chapter 5 – Scenery Management System Application* and the *Glossary of Landscape Aesthetics, A Handbook for Scenery Management*. The alternative method to Handbook Chapter 2 presented here is based on the use of two indicators for evaluating scenery: Scenic Integrity and Scenic Stability.

SMS Appendix J clarifies the definition of scenic integrity in which it becomes an indicator of visible disturbance to the valued scenery, rather than ecosystem intactness or an immeasurable blend of the two. It adds a second scenery indicator, Scenic Stability, to identify and measure the sustainability of the valued scenery. Use of this indicator ensures that the sustainability of scenery is addressed as an issue and integrated into the project. Figure 2 illustrates how these changes fit within the SMS process.

Figure 2 Scenery Management System process using SMS Appendix J.



Purpose and Need for Action

The primary purpose of the Flagstaff Watershed Protection Project (FWPP) is to reduce the risk of high severity wildfire and subsequent flooding in two key watersheds around Flagstaff, Arizona: in the Dry Lake Hills portion of the Rio de Flag Watershed, and the Mormon Mountain portion of the Upper Lake Mary Watershed. The EIS will analyze a variety of harvesting and fuel reduction methods, including the use of traditional ground-based equipment, hand thinning, and also methods atypical for the region, including cable and helicopter logging, in order to treat steep, inaccessible terrain.

The FWPP analysis area includes approximately 10,543 acres (roughly 7,569 acres in the Dry Lake Hills portion and 2,974 on Mormon Mountain) and includes portions of the Coconino National Forest that have either not been analyzed or not been treated previously due to prohibitive costs associated with very steep terrain, low value material, and other challenging issues such as potential impacts to wildlife and visual concerns.

There is a need to reduce the risk of fire and post-fire flooding that would likely damage the drinking water infrastructure south of town and which could also cause extensive damage to residential and commercial areas should a high-intensity wildfire occur in mountainous areas that make-up the Upper Lake Mary and Rio de Flag watersheds.

More specifically, there is a need to reduce the potential for crown fire and high intensity surface fire, and to reduce the likelihood of human-caused ignitions.

Overview of Issues Addressed

Disturbances across the landscape can be beneficial and even critically important to forest health and sustainability and to the safety of forested communities but can also have detrimental impacts to scenery.

Two issues were identified and will be analyzed in this report. The first was identified during project scoping in 2013a relating to scenery (Forest Service), and the second is required by the Forest Plan (Forest Service, 1987) as a measure of progress toward desired conditions for scenery.

1. What are the potential impacts to scenic resources as a result of implementation due to the highly valued viewsheds contained within the project area?

Measure: Comparison of existing scenic character to desired scenic character (descriptive). Scenic character descriptions encompass both ecological components and cultural values. Existing scenic character provides a baseline to compare the anticipated changes from the proposed action and whether this will make progress toward the desired scenic character.

Measure: Description of expected disturbance and duration of disturbance upon completion of the project (years).

2. Will progress be made toward desired scenic integrity objectives and scenic stability?

Measure: Comparison of projected progress toward scenic stability and scenic integrity (acres).

Affected Environment

Introduction

Viewing natural features is one of the most sought after recreation activities on the Coconino NF. Almost three-quarters of visitors to the forest report participating in this activity and over 90% of users were satisfied with the condition of the scenery (Forest Service 2012). Scenic quality within the Flagstaff Watershed Protection Project is particularly important to those who enjoy recreating at and living near the project, but in a broader sense, the project area is part of the scenic backdrop for the Flagstaff area. Scenery also contributes indirectly to local quality of life, tourism and economic vitality, and the forest's scenic heritage. As noted in the Flagstaff Regional Plan (City of Flagstaff 2014), "Underlying the *Flagstaff Regional Plan* is the basic principle that a healthy natural environment is necessary for a healthy and prosperous human community and economy. The protection of the natural environment is a common thread running through most chapters of this Plan."

The proposed project is a direct result of the experience of the Schultz Fire in 2010 demonstrated the potential for severe downstream impacts even when residential areas are spared from the fire itself. Following the Schultz Fire, severe and repeated flooding occurred in unincorporated neighborhoods just outside Flagstaff city limits, causing tens of millions of dollars of damage to infrastructure and private property. In 2012, residents of Flagstaff approved a \$10 million bond to support forest restoration work within key watersheds on the Coconino NF and State of Arizona lands. With this action, residents of Flagstaff showed their appreciation not only for the beauty of the place and desire to retain it, but also an understanding of the risks of living in the forest-urban interface and desire for a more sustainable forest.

The FWPP project will help achieve the desired conditions for scenery as defined in the forest plan (Forest Service 2013): "The scenic values of the Coconino NF are conserved and enhanced".

Existing Condition

Sense of Place. Mount Elden and the Dry Lake Hills are one of the dominant elements forming Flagstaff's sense of place nestled among the volcanic field of the San Francisco Peaks. Similarly, Mormon Mountain serves as the backdrop to the community of Mormon Lake, Arizona. The mountains have been resources for humans through time providing water, forest products, forage for livestock, habitat that supports game and wildlife, and as a part of people's lives and culture. Local residents as well as visitors from the state, region, country and internationally (Forest Service 2012) enjoy the scenic beauty of this place as noted in the National Visitor Use Monitoring Surveys. The mountains are a reminder of seasonal change, as well as viewing pleasure. The project areas are highly visible from major highways in the surrounding area including Interstate 40, US Highway 89A, and State Highway 64, and Forest Road 3 (Lake Mary Road), as well as the BNSF railroad which includes Amtrak passenger train service. Thousands of people travelling through the area view the attractive picture of the small town in the mountainous setting and the small community of Mormon Lake seating between the mountain and lake. As such, these areas a part of each community's image and sense of place.

The FWPP's forested character and important role in for forest users and visitors is documented in the Coconino's recreation niche (Forest Service 2008):

"The Coconino NF is a special place because of its elevation differences ranging from 2,600 to 12,633 feet supporting diverse animal life, plant life, climate, seasonal

opportunities, and geology. Prehistoric and historic cultures had strong connections to this landscape which today inspires visitors and has a restorative effect.”

Existing Landscape Character.

The Dry Lake Hills (DLH) portion of the project area is in the San Francisco Peaks Landscape Character Zone landscape character type. It is characterized by ponderosa pine, mixed conifer (added by author), and spruce-fir forests with inclusions of aspen adding variety to the landscape year round. Desired conditions for scenery would be to “move toward historic, pre-European settlement conditions. Forests would be characterized by uneven-aged groups of pines, widely spaced...” (Forest Service 2011).

The Mormon Mountain portion of the project area is in the Ponderosa Pine landscape character zone. Vegetation is composed mostly of ponderosa pine forests, with this area being part of the largest contiguous stand of ponderosa pine in the world. Some mixed conifer forests with inclusions of aspen can be found on Mormon Mountain... (Forest Service 2011).

Landform. The igneous rocks of the San Francisco Mountain volcanic center are variable and complex (Holm 1988). Elden Mountain is a dacite structure with sedimentary rock outcrops that are tilted and faulted. Dry Lake Hills were uplifted during the formation of Elden Mountain. There are numerous basalt flows from Dry Lake Hills through Switzer Mesa, some are covered by dacite flows from Elden Mountain and later andesite flows. The Mormon Mountain volcanic field is in the transition between the Basin and Range and Colorado Plateau (Gust and Arculus 1986). It is composed of igneous rocks including basalt, andesite, dacite and rhyodacite. These volcanic origins result in rocky outcrops and formations as shown in Figure 3.

Figure 3 Rocky outcrops on Mt Elden. (photo courtesy of Mountain Project, taken by JJ Schlick)



The landforms have had minor modifications as forest roads, recreation facilities and trails have been built. There is also evidence in places where past vegetation manipulation has occurred such as stumps, cull logs and so on.

Structural modifications are noticeable and detract somewhat from the scenic qualities of the areas.

Waterform. Seeps, springs and stream courses are minor attributes of the landscape character. They contribute to the valued image of the landscape. There are two main drainages in the DLH-portion of the project area; Schultz Creek and Spruce Avenue Wash (see more details in Watershed report). These drainages are both tributary to the Rio De Flag. Schultz Creek joins the Rio De Flag just south of the Museum of Northern Arizona on State Highway 180. Spruce

Avenue Wash joins Switzer Canyon Wash prior to entering the Rio De Flag just southeast of the intersection of East Butler Avenue and South 4th Street in Flagstaff, Arizona.

There are two main stream courses with headwaters in the Mormon Mountain-portion of the project area that enter Lake Mary, Newman Canyon and an unnamed stream course (Runyon 2014). Roughly 44% of the project area (1300 acres) drains through Newman Canyon. Except for roughly 22 acres (less than 1%) of the project area that drains through Railroad Wash entering roughly the upper portion of Upper Lake Mary, surface flow from the remainder of the project area is directed through an unnamed drainage entering the upper end of Upper Lake Mary.

Vegetation. The overstory vegetation is the most dominant scenic attribute in the project area. Both Dry Lake Hills and Mormon Mountain have coniferous cover in most places as noted in Figure 4. In the lower elevations, ponderosa pine is prevalent. With increased elevation or northerly aspects, the vegetation changes to mixed conifer. There are scattered clumps of aspen, Gambel oak, and juniper depending of moisture, elevation and aspect. The understory vegetation is a minor scenic attribute largely because it is overtopped by dense coniferous vegetation.

Aspen is an important visual component in the project area, both for the contrasting color, scale and texture that stands provide and for the seasonal color change that attracts viewers to the area. Gambel oak is also an important visual component. Oak trees provide a contrast in color, texture and scale. Both aspen and Gambel oak are sparsely scattered throughout the project area.

The project area's dominant scenic identity is the conifer forest with some rocky outcrops overlaying moderate to steeply sloping volcanic landforms as noted in the examples shown below. The project areas are viewed from the foreground, middleground and background

Figure 4 Almost contiguous coniferous forest common in the project areas, as shown in Dry Lake Hills.



from roads and trails. Grassland openings less than 5 acres in size are difficult to distinguish due to dense vegetation, but some do exist. Other scenery attributes include volcanic rocks and outcrops of all sizes. Seasonal changes including reliable winter snowfall accents the scenery as do wildlife sightings of birds and mammals. Research shows that such diversity of scenery attributes supports a positive viewing experience for people traveling through or recreating within the project area, and supports the quality of life for local residents and visitors (Ryan 2005).

Ecosystem Context

This section provides a link between scenery and the ecosystems in the project area. A scenic stability analysis was completed (Appendix A) that identifies and measures the sustainability of the valued scenery attributes. Scenic Stability considers the condition of the valued scenery attributes identified in the scenic character description of the Flagstaff Watershed Protection Project. It evaluates whether their condition is within the historic range of variability reference conditions, the range of conditions that indicate a properly functioning ecosystem. Stability also considers stressors that can affect scenery such as wildfire and insects and disease. Stressors may not threaten scenic attributes when the forest is functioning within reference conditions, but may become detrimental when the forest functions outside of these ranges.

Vegetation and landform both offer significant opportunities for scenery. The steep slopes of the Dry Lake Hills and Mormon Mountain make them a dramatic landscape features. Rocky outcrops and formations contribute to the unique identity of the mountain, and contribute to the complexity of planning management activities that may occur there. The vegetation carpets the landscape and provides the character of the area. There are also significant risks present in these landscapes due to the density of the forest, lack of fire, high quantities of fuels and steepness of the topography.

Vegetation is the dominant scenery attribute of the FWPP project areas. Both ponderosa pine and mixed conifer are identified as dominant attributes. Several aspects of vegetation have been evaluated as related to the desired conditions noted above. Age and size class diversity and tree density are evaluated comparing historic conditions to the existing condition.

Water form as defined for scenery management refers to surface water occurrence and characteristics (Forest Service 2000). No water form related attributes will be considered because of the lack of perennial surface flow or ponding. Rather than consider stream channels as water, they will be addressed under landform. Stream channels will be considered as a minor scenery attribute related to the potential risks associated with wild fire, intensive weather conditions (that could result in flooding), and damage to large watershed landscapes.

Landform is identified as a minor scenic attribute. As noted above, stream channels were evaluated as part of the landform, and roads are evaluated as they relate to soil stability and human caused changes.

Table 3 summarizes the scenic stability analysis for the project areas. For detailed information and analysis of the scenery attributes refer to Appendix A.

Table 3. Summary of scenery stability evaluation with condition and risk ratings.

Scenery Attribute	Desired Condition	Existing Condition	Scenic Attribute Condition	Scenic Attribute Risk
Major Scenery Attributes: Ponderosa Pine and Mixed Conifer	Reduce overall stand densities and move stand conditions toward forest structures considered to be more typical of forest structure under pre-settlement fire regimes. Improve tree vigor and resiliency. Improve the diversity of age classes and structure of woody vegetation.	Ponderosa pine and mixed conifer forests within the project are generally denser and more continuous than in reference conditions and accumulations of forest litter and woody debris are much higher than would have occurred under the historic disturbance regime. Lack of fire disturbance has led to increased tree density and fuel loads that increase the risk of uncharacteristically intense wildfire and drought-related mortality. There is a high risk of insect and/or disease outbreak, which is also a function of increased tree density.	Poor	High
Major Scenery Attributes: Ponderosa Pine and Mixed Conifer	Large, old age trees are well represented across the project area.	About five percent of the ponderosa pine and 35% of mixed conifer are classified in the old forest cover type (VSS 6 per table 4). The Coconino NF Management Plan (Forest Plan) direction is for a minimum of 20% allocated to old growth. Most sites currently do not fully meet the minimum criteria for ponderosa pine or mixed conifer old growth conditions as listed in the forest plan.	Poor	High
Major Scenery Attributes: Ponderosa Pine and Mixed Conifer	Much of the forest has open appearance of tree groups and openings making the forest more resilient to mortality from insects and disease.	Use of the bark beetle hazard model for southwestern ponderosa pine and draft Ips hazard model indicates approximately 8 percent of the ponderosa pine analysis area has a low bark beetle hazard rating, while 21 percent of the area has a moderate rating and the remaining 71 percent has a high hazard of beetle attack. Evaluation of the ponderosa pine dwarf mistletoe infection shows approximately 66 percent of the area is not infected or has a low infection level, with less than 20% of the trees infected.	Fair	Moderate
Major Scenery Attributes: Ponderosa Pine and Mixed	Reduce fuel buildup to help prevent the spread of wildfire onto private property and into drainages leading to the City of Flagstaff and its	Over 65% of Dry Lake Hills and 75% of Mormon Mountain have extreme fire hazard ratings. In the Dry Lake Hills, 88% of the project is in Fire Regime I, Condition Class 3 ¹ . At Mormon Mountain, 88% of the area is in	Poor	High

Conifer	municipal watersheds and reservoirs. Reduce the risk for high intensity stand-replacing wildfires and reintroduce fire as a natural part of the ecosystem.	Fire Regime I, Condition Class 3. Approximately 51% of Dry Lake Hills and 70% of Mormon Mountain have potential for crown fire.		
Minor Scenery Attribute: Stream Channels	Reduce overall stand density and improve understory vegetation, providing for stable landform especially stream channels.	The majority of soils in the MM analysis area have moderate soil erodability factors due to steep slopes.	Poor	High
	Use of existing forest roads and temporary roads and avoid construction of new permanent roads will maintain the landscape character.	The scenery attribute condition for existing roads is strong, and they are at low risk because they receive regular maintenance as part of the designated system of roads. Scenery attribute condition for temporary roads is fair, and stressors are moderate.	Fair	Moderate

The scenic stability determination finds that of the scenery attributes selected and evaluated for the existing condition, four are at high risk and two at moderate risk. This would mean that there is **HIGH** risk to **MOST** attributes and **FEW** are stable. For this project scenic stability is **VERY LOW**. Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.

Cultural Context

The project area is highly visible and viewed by large numbers of people from from important heavily used travel corridors, including Interstate 40, Highways 89 and 180, Forest Road 3 (Lake Mary Road) and secondary travel-ways through the forest. Beyond the project area, private landowners and hikers, mountain bikers, equestrians and scenic drivers view the planning areas and the surrounding landscapes from the trails and recreation sites as well as homes, backyards and porches. The landscapes they view on a daily basis are likely very important to their quality of life. Gobster (1996) contends that “in forests...people form perceptions of place based on what they see and experience from an aesthetic point of view”.

In the 2010 National Visitor Use Monitoring survey (Forest Service 2012), visitor satisfaction was measured. Over 90% of those surveyed indicated high satisfaction for the condition of the scenery. The importance of the surrounding forested environment and attractive scenery are also repeated themes mentioned in the Flagstaff Regional Plan 2030 (City of Flagstaff 2013). The benefits of high-quality scenery are numerous despite the fact that a dollar value is seldom assigned to it, except in regard to real estate appraisals and overall tourism revenue to communities.

Desired Condition

The desired scenic character (DSC) identifies the most aesthetically desirable set of valued and sustainable scenic character attributes as possible given the multiple land uses compatible with a particular landscape. Based on the purpose and need and proposed action, Table 4 provides a comparison of existing conditions, desired conditions, and desired scenic character. Progress

toward the DSC is achievable through the project level activities proposed in this project in the long term. Since the activities required to move the project toward desired conditions are substantial in some areas, short term interim scenic integrity levels will be employed during implementation.

Interim scenic integrity levels acceptable during implementation will follow the forest plan guidance that Scenic Integrity Objective (SIO) in the treatment area may drop one level during project implementation in the short term, but must meet or exceed the mapped SIO in the long term. For examples areas mapped with an SIO of high can move down to moderate in the short term, but must meet high SIO in the long term. Implementation of the FWPP project could take up to ten years to complete, short term effects could last as long as ten years following project completion. Long term effects would be eleven years and beyond.

Table 4 Comparison of existing conditions, desired conditions and desired scenic character.

Existing Condition	Desired Condition	Desired Scenic Character
Lack of recurring fire has resulted in proliferation of smaller trees that have reduced or replaced openings	Mosaic of openings and groups of trees that are maintained by low severity fire (historical condition)	Scattered groups of trees with grassy openings between that provide natural contrast and species diversity. A mosaic of openings and groups of trees allows existing scenic views and attributes to be seen.
Lack of age and size class diversity and trend toward even-aged structure. In areas with uneven-aged structure there is a lack of age and size class diversity.	All size and age classes of trees present and trend toward uneven aged structure (historical condition)	Uneven aged groups of trees – all age and size classes present, but distributed across the landscape in groups and clumps. Different sizes and forms create variety and pattern across the landscape that is characteristic of the ponderosa pine forest and is the dominant visual element. Uneven aged groups of trees are also desirable in the pinyon-juniper woodlands.
Reduced tree vigor and health leading to lack of resilience to disease, intense wildfire	Improved tree growth and vigor (forest plans)	Forest health is improved resulting in better resilience. Scenic attributes are sustainable into the future.
Under representation of old, mature trees	Retention of existing old mature trees and improved tree growth and vigor to promote growth of future old aged trees (historical conditions and forest plans)	Large old mature trees are a prominent component of the uneven aged forest. The form and shape of large trees and presence of a mature forest structure is critical to the landscape character of the ponderosa pine and mixed conifer forests.
Small trees reduce or remove openings, reduce sunlight to the forest floor resulting in sparse understory vegetation and lack of stability of stream courses.	Increased understory grass and forb production (historical conditions) Restore stream courses to a functioning condition that promotes the establishment of native vegetation and reduces sediment flows. Maintain or improve their scenic quality.	Diversity of species and healthy understory vegetation is critical to the composition and attractiveness of forest settings. Diverse forest communities include trees, shrubs, grasses and forbs native to the area. The aesthetic experience of the ponderosa pine and mixed forest increases when the species diversity includes both fine and coarse textures, patterns, scales and colors. Stream channels provide scenic diversity and are important components of the forests.

		They contrast with forested settings and different plant species are often present. They provide important views.
Fire regimes have shifted to lower frequency high severity surface and crown fires.	Reintroduce fire to the landscape by reducing the potential for crown fire and high severity surface fire and moving toward more frequent lower severity fires (historical conditions)	Fire evidence is reintroduced as a natural element of the scenery in an irregular mosaic of burn patches and as maintenance burning occurs, with low to moderate burn severity. Burning is essential in order to re-establish scenic stability.
Existing roads are maintained and temporary roads are used then restored maintaining the existing landscape character.	Roads are maintained and in good condition. Temporary roads are restored to their natural condition. Promote and maintain vegetation re-establishment. (travel management, FS directives, and forest plans)	Forest roads provide important viewing platforms for scenery. Restoration of roads closed in TMR and temporary roads re-establishes native vegetation and move these places toward the characteristic landscape, and improves the scenic quality of these areas. Restoration improves the contrast between roadbeds and the naturally occurring landscape.

Scenic Integrity Objectives

The scenic integrity objectives (SIO) for the project area are illustrated in Figures 3 and 4. For the FWPP project, these represent the long term goal for fuels reduction, and are incorporated in the desired conditions as proposed above. Almost all of the project areas are mapped as SIO high, and the remaining small areas are mapped as moderate.

Figure 5 Scenic Integrity Objectives for Dry Lake Hills.

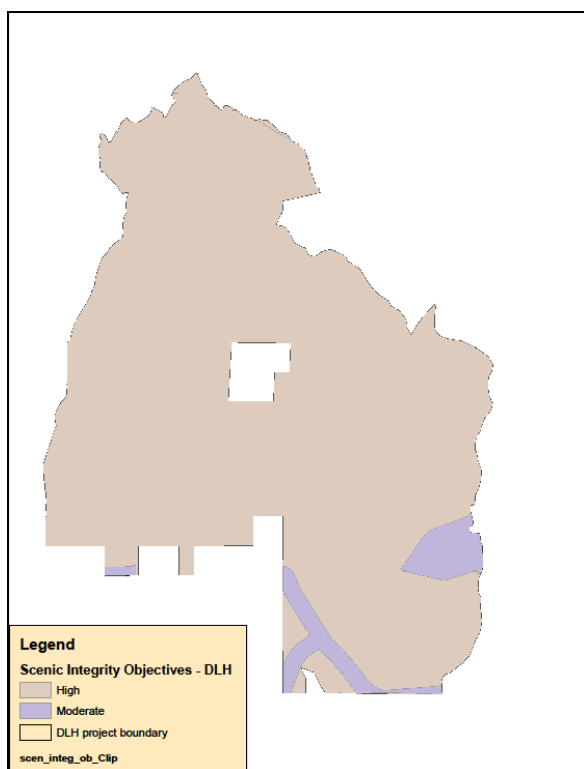
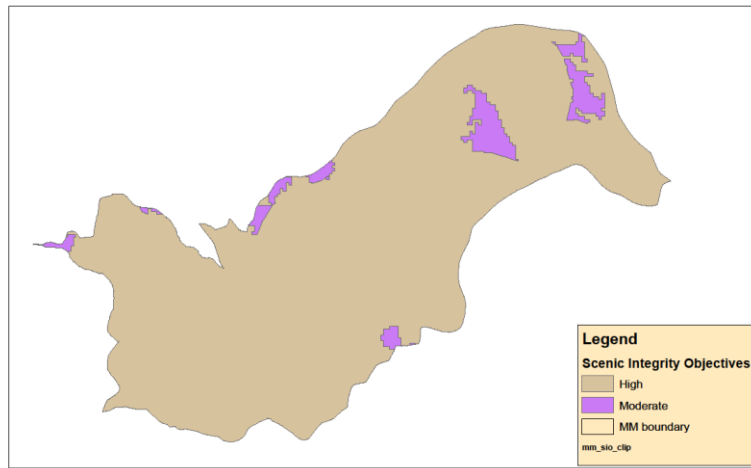


Figure 6 Scenic Integrity Objectives for Mormon Mountain.



Per the SMS Handbook (Forest Service 2000): high scenic integrity refers to landscapes where the valued landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture and pattern common to the landscape character so completely and at such a scale that they are not evident. Moderate scenic integrity refers to landscapes where the valued landscape character “appears slightly altered”. Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Scenic Integrity

At the lower elevations of Dry Lake Hills and Mormon Mountain, ponderosa pine vegetation forms a dense coniferous cover. The pine trees have a somewhat spreading conical, upright form with brown to black tree boles and olive-green fine textured needles. Deciduous trees have a wider, shorter shape in contrast to the conical pine trees. Oak and aspen have moderately coarse textures and in growing seasons, a brighter green colors that is readily visible in contrast to the olive green conifers. This color contrast is even more noticeable in the fall when the deciduous tree leaves turn colors. In winter, the lighter grey bark color of the deciduous species contrasts with the brown/black of pine tree boles. Below the pine trees is a sparse understory of shrubs, grasses and forbs. The understory is mostly a low, fine textured form, although downed logs and rock outcrops provide contrast to the uniform texture. Understory colors include greens, tans, and shades of grey. In drainages there are shrubby species that add complexity in the midstory complexity of form, as well as contrasts in color, texture and pattern.

In the mixed conifer, the narrow, conical nature and varying colors of the different species is more noticeable. Less of the tree bole is visible and the tree branches extend down closer to the forest floor. There is little understory vegetation under the dense mixed conifer trees. Where openings are present, there is a grass-forb understory. In places, aspen is mixed with conifers and provides a contrast in color, texture and shape. Meadows provide welcome views as well as low, uniform and finely textured shapes.

The vegetation offers opportunities for ecosystem improvement. The current excessive vegetation density and hazardous fuels conditions are inconsistent with the Desired Scenic Character and scenic stability. Among the many potential scenery attributes that are under-represented are large, old trees, diverse age groups and mature forest structures (especially aspen and pines as individual trees and groups), meadows, and a diverse understory with shrubs, grasses and forbs.

Many meadow areas have decreased in size and are being encroached upon by conifers, and/or are obscured from view by dense coniferous vegetation in ponderosa pine, mixed conifer types. Inter-tree spaces have mostly disappeared.

The dense conifer vegetation obscures visibility to even nearby volcanic rock forms and outcrops, and the understory is often sparse and lacks diversity. Many “view windows” outward to adjacent areas and to other noticeable landforms are obscured by vegetation. In addition, human constructed features including buildings, recreation sites, roads, and trails, as well as management activities such as logging and fire suppression have interrupted and diminished scenic vegetation attributes in most places within the project area. The sum of these occurrences has resulted in forest canopy that is excessively dense and uniform, or, fragmented in patterns and shapes inconsistent with the historic, vegetative mosaic.

Existing roads in the area also offer opportunities for ecosystem improvement. Many of the high clearance and closed roads run straight up and down slopes. Relocation of forest system roads that have overly steep sections will improve their stability. Forest roads create linear features through the landscape. These linear roads and cleared areas contrast with the characteristic landscape. They also provide viewing platforms into the project area as well as from the mountain into the surrounding landscape.

As noted in the purpose and need of the FWPP, is to reduce the risk of high severity wildfire and subsequent flooding in two key watersheds around Flagstaff, Arizona: in the Dry Lake Hills portion of the Rio de Flag Watershed, and the Mormon Mountain portion of the Upper Lake Mary Watershed. The proposed project would result in better forest plan compliance as well as improved watershed conditions contributing to the City of Flagstaff water supply. The project will meet Forest Plan direction for scenery is to “Projects are planned to meet or exceed visual quality objectives (Forest Service 1987) and the scenic values of the Coconino NF are conserved and enhanced (Forest Service 2013). Reduction of risk to the scenic attributes will help to meet Forest Plan direction as well as ensuring that the valued scenery will be available into the future.

Environmental Consequences

Spatial and Temporal Context for Effects Analysis

The timeframes for direct and indirect effects will include the potential for scenery disturbances up to ten years following project implementation. The analysis area for direct and indirect effects is the project area. The timeframe for cumulative effects is 20 years and the area includes the north section of the Coconino NF.

Connected Actions, Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

The following list of activities will be considered in the cumulative effects analysis.

		PAST	PRESENT (ONGOING)	REASONABLY-FORESEEABLE
DRY LAKE HILLS	Forest Thinning & Burning Projects	Fort Valley Experimental Forest (thinning & burning)		
		GFFP thinning around communication site		
		Wing Mountain Fuels Reduction Project		
		Eastside Fuels Reduction Project		

		Jack Smith Schultz Fuels Reduction Project (and ongoing)		
				4FRI
				Treatments on the Navajo Nation parcel as well as adjacent State and private land
	Wildfires	Schultz Fire (2010) 15,075 acres		
		Radio Fire (1977) 4,594 acres		
	Restoration Work	Schultz Reforestation		
		Schultz Sediment Reduction (acres)		
	Recreation	Arizona Trail construction		
			Special Use Events	
			Fort Valley Trails	
				MEDL
			Hunter Access to Aspen Depredation	
	Grazing	Peaks Allotment (pastures not grazed in over 10 years; deferred from grazing now)		
	Lands Projects			Elden/Devils Head comm sites – potential tower additions
		Travel Management Rule		

Alternative 1 – No Action

If the proposed action were not implemented, the project area would continue to be mostly natural-appearing for several years. Important scenery attributes such as open and diverse overstory vegetation and healthy understory would continue to have overly dense growing conditions and views into and out from the forest would be blocked by trees. The large, old tree character that historically contributed to the attractiveness of the area would be limited. Historic fire regimes would not be re-established, limiting nutrient recycling and allowing the density of forest fuels to increase. Existing steep roads closed in the Travel Management decision and those with overly steep segments would not be restored or relocated. These would continue to be used, torn up and contrast with nearby scenery. Stream channels would remain sparsely vegetated due to existing forest density. There would be no potential for a more diverse understory plant component.

At some point, overstocked vegetative conditions may be attacked by insects or disease, or experience an uncharacteristically large and intense wildfire that would burn much of the vegetation that is the dominant scenic attribute. While some insect and disease activity occurs every day, the overly dense conditions combined with extreme weather events characteristic of climate change could allow these to escalate and become wide spread. Large, high intensity fires have become more common with increasing tree density and lack of a regular fire regime. Large scale events such as these would be outside the range of historic variability. (See fire and silviculture specialist reports for more details about tree density, insects and disease and fire risk and effects.)

In the event of an uncharacteristic high severity wildfire such as the Schultz Fire, the existing landscape character would be suddenly altered with little opportunity to slow or control the

change. The SIO's in the project area would have to be remapped and uncharacteristic high severity, large-scale wildfire would redefine and reshape the existing landscape character for decades if not centuries. The Radio Fire on Mt. Elden in 1977 as shown in figure 7 shows an example of high intensity wildfire and an example of the effects on the landscape following the Schultz Fire in 2010.

The appearance and character of the area would shift from green and densely forested to burnt, patchy and open. The overstory component and green canopy would be absent or drastically reduced, depending on the severity of the fire. For at least a decade, the landscape would be dominated by blackened, dead standing trees; if allowed to come down on their own, the trees would likely fall in a dense, jack-straw pattern. Although short term, smoke from high intensity

Figure 7 Example of high intensity wildfire on Mt Elden, and effects on vegetation following Schultz Fire



wildfire would cause scenic quality to be diminished and if thick enough, would obscure views to nearby scenic attributes.

In the short term following high intensity fire, emergency fire suppression actions such as fire lines and emergency post-fire rehabilitation treatments could result in unnatural linear disturbances on the landscape. With rehabilitation and other mitigation measures, the immediate impacts of the suppression and emergency treatments should not be evident to the casual forest visitor within 2 to 3 years of completion, although effects from the fire itself would remain visible much longer. For two to three growing seasons, the blackened, exposed ground surfaces would be highly visible due to lack of vegetation. Sedimentation and erosion would increase, raveling soils that would take a long time to revegetate. Eventually these areas would be covered with spotty vegetation and invasive weeds until native material became established. Within 5 years, the effects of the fire would begin to be viewed in a somewhat more positive light as the shrubby understory became more abundant. There is some risk that a vegetation type change could occur especially if there is wide spread drought, and/or if trends toward higher temperatures, and less annual precipitation continue. There is some evidence of this potential in the Radio Fire area where ponderosa pine seedlings were planted but unsuccessful in restoring the forest. These changes would be visible throughout the project area in the foreground of Forest roads and trails, and as middle ground and background views from communities within the project area, trails, and developed recreation sites.

Initial public reaction to a large-scale fire tends to be negative, as many people do not consider extensive, blackened landscapes to be natural or beneficial (Ryan 2005). These effects are often perceived by local residents as devastating to their community and way of life; non-local forest

visitors may regard the effects of a catastrophic fire as interesting and something “to be seen” but also as a degradation of the scenic quality.

Indirect effects of high intensity wildfire include short term and temporary smoke that would affect nearby subdivisions, Flagstaff, and as with large, high acreage blazes, could affect Sedona and Verde Valley, Winslow, Holbrook, Mogollon Rim communities, Grand Canyon and residents of the Navajo Nation. Effects would include smoky conditions and decreased visibility, and would last until the fire was contained and declared as “out”.

There could be wide spread flooding and sediment transport into nearby communities and neighborhoods. Other indirect effects of high intensity wildfire could include damage to the project area watersheds with subsequent effects to local reservoirs, the City of Flagstaff water system, and the scenic character of locally important recreation sites such as Mormon Lake, Upper and Lower Lakes Mary, the Rio de Flag, as well as hiking trails, driving for pleasure, scenery and wildlife viewing opportunities and others. Many times flooding and sediment transport will continue to occur for many years and even a decade after the wild fire.

Under this alternative there would be no opportunities to enhance and improve scenic resources or achieve the desired condition since there would be no thinning or other treatments. It would maintain the existing landscape character in the short term, but in the long term the existing landscape character would decline.

Cumulative Effects

The cumulative effects analysis area is the ponderosa pine forest on the Coconino and Kaibab NF's. The timeline for analysis is 20 years because most long-term effects of the alternatives are assessed out to a 20 year timeframe (with the exception of large scale high severity wildfire which is more difficult to project).

The following is list of actions relating to scenic attributes, landscape character and scenic integrity considered in the cumulative effects analysis for this project:

- Past activities that created the current conditions include grazing, the evolving forest management practices related to timber harvest and fire suppression, drought, disease and insect infestations, dispersed and developed recreation, and utility corridor clearing.
- Present and future activities such as vegetation management, fuels management, utility corridor clearing and new utility corridors, and other management activities (e.g. noxious weeds treatments). These activities could occur on private lands as well.

The cumulative effects of past management activities are visible as the existing conditions. Vegetation management practices, fire suppression, and over grazing have resulted in the current mostly even-aged forest structure, overstocked conditions, and sparse understory trees, shrubs, grasses and forbs.

The short term cumulative effects (1-5 years) of the No Action alternative combined with similar current and future restoration treatments and prescribed burning projects are expected to be negligible, unless additional large scale, high severity wildfires occur in the ponderosa pine type. If wildfires burn large areas, the scenic quality would be decreased, and there would be long term negative changes (10 to 100 years) in scenic character. The scenic attributes that contribute to high scenic integrity, such as an open forest with tree groups of varying ages, sizes and shapes,

large, mature trees, and healthy, diverse understory would not be present. The scenic impact of a high-severity wildfire would combine with scenic impacts from adjacent land development, powerline development and maintenance, and impacts from dispersed recreation use to result in a cumulative impact so that scenic integrity is greatly diminished in areas burned for up to a decade or more. In some places there would be a chance that climate change could contribute to type changes in parts of the ponderosa pine forest so that these characteristics would be replaced with difference landscape characteristics, which would also cumulatively impact scenic attributes.

In the absence of large, high severity wildfires, long term cumulative effects of the No Action alternative and present and future vegetation management and prescribed burning projects would be small and localized. In the absence of large scale treatment, the scale of treatments that are currently accomplished would not result in improvement to scenic stability or scenic integrity. The desired landscape character of an open forest with tree groups of varying sizes, shapes and ages, presence of large, mature trees, and healthy, diverse understory would not be met. This could combine with scenic effects such as scenic impacts of bare ground from grazing and recreation use and scenic effects from unhealthy forest conditions resulting from disease and drought to result in a trend toward declining landscape attributes, and less sustainable landscape character.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

This alternative would not meet the project's desired conditions or forest plan direction. It would not move the project area toward scenic stability. Over time, scenic stability would decrease and move to no stability. No action would result in continuation of current risks to scenic attributes and it is reasonable to assume that these risks increase each year and could be exacerbated by climate change. The No Action alternative would not meet long-term scenic integrity objectives since these are dependent upon improving the condition of scenic attributes so that they are more resilient to ecological stressors.

Irretrievable and Irreversible Commitment of Resources

This alternative does not propose changes and thus does not have any irretrievable and irreversible commitment of resources except for those associated with a high-severity wildfire, discussed above.

Common to All Action Alternatives

Irretrievable and Irreversible Commitment of Resources

The action alternatives focus on reduction of fuels to reduce the threat of high severity wildfire and subsequent flooding in two key areas near the City of Flagstaff, Arizona: the Dry Lake Hills portion of the Rio de Flag Watershed north of Flagstaff, and the Mormon Mountain portion of the Upper Lake Mary Watershed south of Flagstaff. As such, there is no irretrievable or irreversible commitment of resources.

Design Features for Scenery

Vegetation and Fire Activities:

1. Edges of Individual Units

When thinning forest vegetation geometric shapes will not be introduced and high contrast will be avoided between treatment locations. Use the following techniques:

- a. Shape and/or feather the edges of treatment areas to avoid abrupt changes between treated and untreated areas.
- b. Where the treatment unit is adjacent to denser forest (treated or untreated), the percent of thinning within the transition zone (150-250 feet) will be progressively reduced toward the denser edges of the unit.
- c. Similarly, where the treatment unit interfaces with an opening (including savannah and grassland treatments, and natural openings) the transition zone will progressively increase toward the open edges of the unit.
- d. Soften edges by thinning adjacent to the existing unit boundaries. Treat up to the edges, do not leave a screen of trees. Favor groups of trees complying with the prescribed treatment that visually connect with the unit's edge to avoid an abrupt and noticeable change.
- e. Treatment boundaries should extend up and over ridgelines to avoid the "Mohawk" look.
- f. Avoid widely spaced individual trees that are silhouetted along the skylines.

2. Unit Marking

- a. Avoid using trails as boundaries especially for different prescribed treatments.
- b. Avoid abrupt changes between treatment units. Use the techniques suggested for edges of treatment units (above).

3. Road, Skid Trail and Landing Construction

- a. Utilize dust abatement methods during haul of logs during the season when dust is likely and funding is available. Priorities would include residential areas, private land and adjacent to recreation sites. Coordinate with Coconino County on the application and timing of application of dust abatement on road segments that have County Maintenance responsibilities.
- b. Utilize existing skid roads and landings to the extent possible.
- c. Log landings, temporary roads, and skid trails should be minimized within sensitive viewsheds such as those next to developed recreation sites, private homes or communities, paved and passenger car level roads and trails.
- d. Log landings, skid trails and temporary roads will be rehabilitated including restoring proper drainage, and reseeded as needed with native species.
- e. To hasten recovery and help eliminate unauthorized motorized and non-motorized use of skid trails and temporary roads, use physical measures such as re-contouring, pulling slash and rocks across the line, placing cull logs perpendicular to the route, and disguising entrances.

4. Cull Logs, Stump Heights, and Slash Treatments

- a. Cull logs will not be abandoned on landings.
- b. Use cull logs for closing temporary roads and decommissioning roads.
- c. Cull logs may also be suitable to use as down woody material, but must be scattered away from the landings.
- d. Stump heights should be cut as low as possible.
- e. Unless used for erosion control or maintenance of soil productivity, slash on log landings must be treated or removed.
- f. In the seen area immediate foreground of sensitive places (within 300 feet of the centerline of paved or passenger car level roads or trails, or 300' from the boundary of a recreation site or private land/communities):
 - i) Where whole tree logging occurs, machine piling may occur to the middle/back of log landings. Prioritize slash burning in these locations within one year or as soon as possible after treatment.
- g. Root wads and other debris in sensitive foreground areas will be removed, buried, burned, or chipped. If materials are buried, locate in previously disturbed areas where possible. Beyond sensitive immediate foreground areas, it is acceptable to scatter these or use them to help close temporary roads or skid trails.
- h. Place project-generated slash outside of permitted utility line and pipeline rights-of-way; do not interfere with utility corridor management.

5. Fire Control Lines

- a. Construct fire lines where ever possible, to reduce the contrast so that they are not noticeable in the middle and background views.
- b. Generally restore control lines to a near undisturbed condition in the foregrounds (within 300 feet) of sensitive roads, trails, and developed recreation sites.
- c. To hasten recovery and help eliminate unauthorized motorized and non-motorized use of control lines, use measures such as re-contouring, pulling slash and rocks across the line, and disguising entrances to system roads and trails.

Effects Common to All Action Alternatives

Campfire Closure Order: The proposed action would also include establishing a permanent campfire restriction order in the Dry Lake Hills portion of the project area to limit the potential for human-caused wildfire. The current temporary campfire restriction order (Number 04-11-06-F) has been in effect since June, 2011 (reissued June 2013 for two years), and prohibits building,

maintaining, attending, or using a fire, campfire², or stove fire³ (36 CFR § 261.52(a)). The Proposed Action would extend this order permanently in the project area. The campfire closure order would have a positive effect of scenic stability throughout the Dry Lake Hills portion of the project area. The measure would help to reduce the potential for human-caused wild fire and subsequent detrimental effects on scenery.

Presale Activities: numerous activities occur prior to project implementation. Trees are marked either as “leave trees” (those to be left on site), or as “cut trees” (those to be removed). Sale boundaries are also marked to delineate the edges of the project. Potential skid trails, landings, road improvements or reroutes are identified and many other activities. One noticeable activity is the boundary and tree marking. Figure 8 provides examples of tree/boundary marking. Design features provided for the project will help minimize visibility by marking the trees on the side away from roads and trails.



Figure 8 Tree and boundary marking pre-project actions will be noticeable from roads, trails and recreation sites near or within the project.

Conventional Ground Based Harvesting: Conventional ground based harvest systems typically consist of several machines that all perform specialized functions. First a feller-buncher cuts the trees with a high speed disc saw and then places them into bunches for subsequent removal. Wheeled fellers-bunchers, such as those shown in Figure 9 are the dominant felling machines used in northern Arizona and operate well, up to approximately a 25% slope. Beyond 25% it is often necessary to use a tracked boomed feller-buncher seen in Figure 10 that has leveling capability and is capable of operating on steep slopes. These leveling feller-bunchers can work on up to 55% slopes but very rocky ground can limit their operation.

² Campfire: means a fire, not within any building, mobile home or living accommodation mounted on a motor vehicle, which is used for cooking, personal warmth, lighting, ceremonial, or aesthetic purposes. Fire includes campfire.

³ Stove fire: means a campfire built inside an enclosed stove or grill, or a portable brazier, including wood and charcoal fires.

A rubber tired grapple skidder, such as the one shown in Figure 11 then drags whole trees that have been bunched by the feller-buncher, to a roadside landing area. (Note there are NO clearcuts proposed in this project as depicted in several of the following photos.) At the landing, a processor, as shown in Figure 12 removes limbs from trees and cuts them into log length. Finally, a loader like the one in Figure 13 places manufactured logs onto a truck for transportation to a mill. Logging slash, (limbs and tops) generated at the landing can be burned on site or chipped and removed as biomass. Conventional ground based harvesting is generally limited to slopes of 40% or less.

Figure 9 Wheeled feller-buncher.



Figure 10 Tracked boomed feller buncher.



Figure 11 Grapple skidder



Figure 12 Log processor at landing.



Figure 13 Log loader at landing.



Conventional logging typically has moderate short term effects to scenery. During implementation, in most cases whole trees are cut and moved to a “landing” near a haul road. At the landing, the limbs and tops are removed, and the clean logs are decked to be loaded and hauled away. After the trees have been thinned, the slash remains either to be treated in the forest or piled at landings. Effects of logging operations typically include trampling of existing vegetation where equipment is operating, creation of linear skid trails where vegetation is trampled or completely removed exposing bare soil, creation of linear log landings where vegetation has been trampled or removed and bare soil is exposed, and piles of cull logs not suitable for commercial uses. After logs or useable material is removed, most slash would be treated or if biomass removal is possible most slash would be chipped and loaded into trucks. At landings, slash piling may include bulldozers pushing slash into large piles (10-20 foot wide piles, often 10 feet tall) which can trample vegetation and cause bare soil to be exposed. For the purposes of restoring landings and skid trails, a small amount of slash may be retained to scatter and cover the bare ground. Dust from equipment would impair visibility in the immediate areas where activities are taking place. This would be short term and confined to the area around the equipment.

Chipping: Production of biomass by chipping and hauling the material off site generally results in fewer effects. It is not without effects to scenery, these would include dust and smoke from operation of equipment and additional trucks hauling material from the site. There would also be loud noise associated with chipping and blowing material into trucks that may disrupt the viewing experience. Since chipping occurs on site the duration of the noise would last longer than hand or machine piling. Figure 14 shows an example of slash chipping.

Figure 14 Slash chipper in operation (Photo courtesy of R & S Biomass Equipment)



Hand Thin and Pile: Hand thinning usually has little or no short term effects on scenery. Trees are cut down, cut into segments and piled so that it can be treated as shown in Figure 15. Effects may include slash from limbing and topping trees. Project design features require most slash to be treated. There are about 15 acres proposed to be treated in place, effects would be similar to hand thin and pile.

Figure 15 Hand piled slash.



Machine Piling: Bulldozers push slash into large piles (10-20 foot wide piles, often 10 feet tall) which can trample vegetation and cause bare soil to be exposed as shown in Figure 16. Dust is created during piling but would be a short term effect confined to the immediate area where the equipment is working. When the piles are later burned, the heat from the fire can sterilize the ground underneath. The burned areas are susceptible to invasive weeds, and it may take several years for native vegetation to re-establish. The ground disturbance resulting from using machines to pile slash would be noticeable for three to five years after project completion, depending on how quickly the areas revegetate. Scraped trees would heal or scars would become less noticeable over time.

Figure 16 Machine piles are larger than hand piles and create more ground disturbance.



Cut to length: The cut to length, (CTL) harvest system consists of a harvester like that in Figure 17 that cuts trees with a bar saw and then, without releasing them from its cutting head, delimbs and processes them into logs. Limbs and tops are placed in front of the machine and are crushed down as the harvester moves ahead. A forwarder, as shown in Figure 18) then follows in the harvester's trail and loads the cut logs into log bunks on the machine. These logs are carried to a roadside landing free of the ground. Repeated trips by the forwarder on the trail crush the slash into the ground.

If it is desirable to remove more of the slash, it is possible to only process the tree to the extent needed to get it on the forwarder. In some instances it may be possible to not process the tree at all and take it to the landing in tree length form. The stem then must be processed into logs at the

landing. This double handling of the log by the harvester to cut and then later process the tree reduces the cost- effectiveness of the method and does not place slash on the skid trails.

Figure 17 Harvester



Figure 18 Forwarder working on 65% slope.



In the past the Forest Management Plan (Forest Service 1987) has been limited to slopes of approximately 40%. Recent developments in technology now allow some models of harvesters and forwarders to operate on slopes of up to 65% slope for downhill forwarding and 45% uphill. Rocks that protrude from the ground over about 12" limit operability; however rocks that are embedded in the ground without a vertical side above ground do not impede operation greatly.

On steep or rocky slopes a steep slope excavator (called a Spider) may be used to treat vegetation. While they are most often used as an excavator for piling or digging, they can be equipped with a harvester head and can cut, buck and pile standing trees. Their legs operate independently and they push themselves uphill with their boom as shown in Figure 19. They can maneuver around and over fair sized boulders that would limit operations of other machines such as harvesters and feller-bunchers. They are a very specialized machine that is uncommon, especially in northern Arizona.

Figure 19 Steep slope excavator or "spider".



Effects of the steep slope harvesting equipment would be similar to those included in ground based logging noted above.

Aspen Treatments. Aspen treatments to stimulate new sprouting require protection from ungulate browsing following treatments. A variety of treatments would be used including removal of invading conifers within 100 feet of aspen clones, prescribed fire, ripping, planting, fencing and/or cutting of aspen to stimulate root sprouting. Many aspen clones currently have dead and down and dead standing trees. Treatments are small scale and would not be very noticeable with the exception of fencing. Fencing would introduce new linear and unnatural features into the landscape. Use of the fewest contrasting materials would help to make the fencing less noticeable. Protection of sprouts is usually required for many years after treatment so that the sprouts grow large enough to withstand ungulate browsing. It is expected fencing would remain at least 10 years, and possibly longer before it could be removed. It would result in a longer term visual disturbance. It is desirable to keep aspen a part of the ecosystem if successful these treatments would result in improved scenic quality and landscape character.

Grassland Treatments. These treatments would involve removal of encroaching conifers and restoration of presettlement tree density and patterns. There would be short term negative effects, but soon after these areas would show improved scenic quality and landscape character.

Electronics Site Structure Protection. The telecommunication sites would receive thinning treatments. These are permitted facilities that provide important services to the public and they need to be protected. These locations would be thinned to 20 to 40 basal area. Thinning will open up views to the equipment and facilities in place making the contrast between the constructed facilities and surrounding landscape more obvious. At these sites, scenic integrity will only be maintained; it will not be improved.

Strategic Placement of Treatments: Strategic mechanical and fuels treatments would have relatively small effects on scenic quality immediately after treatment. Strategic fuels treatments would enhance fire control lines enabling prescribed fire to be safely implemented. They include hand thinning or use of machinery equipped with cutting or grinding heads on 300 feet either side of control lines. Slash is treated within the cleared area, and this becomes the staging area for implementing prescribed burning blocks. Effects include short term introduction of linear features

throughout the area. Upon completion of prescribed burning it is expected that the linear features will not be as noticeable because the density of trees on either side of the treatment areas would be thinned and/or burned reducing the number of trees and creating a more irregular boundary.

Fuels reduction and reintroduction of fire would have moderate effects on scenic quality immediately after treatment, and low effects after repeat burning.

Pile Burning: Effects from pile burning would be primarily limited to the immediate dead and live fuels of the slash pile, although some scorching and mortality of residual trees would be expected. Following burning, the bare areas are susceptible to invasive species. Mitigation measures for invasive species will monitor and treat infested areas. The hand piled areas are expected to revegetate within 1 to 3 years following burning, machine piled areas are expected to revegetate within 3-5 years following burning. If areas where piles were burned are not naturally restored, it may be necessary to scratch in seed and soil from unburned areas in order to assure vegetative cover.

Prescribed Fire: Prescribed fire would be used on much of the project areas with the procedures tailored to fit the treatment types. Fire may be used in conjunction with mechanical treatments or singly. The objective of prescribed burning is to reduce fuel loading, raise crown base heights and reduce live tree density. Repeat or maintenance burning would help maintain these objectives. Repeat burning in ponderosa pine would occur every five to seven years. In mixed conifer on steep slopes, there may be only one broadcast burn because of the difficulty of implementation in these fuel types and terrain, and because the historic fire return interval is historically longer than the life of this project.

Depending on fire severity, effects would include: charred soil and vegetation immediately following burning; charred bark up to 10 feet from the ground; needle and leaf scorch typically less than 20 feet from the ground; and, loss of understory trees, trees with old scars or trees with large accumulations of dead fuels at their base. In areas of moderate to high severity, openings may be created as a result of more extensive tree mortality. The presence of charred surface vegetation and red or black trees would present a contrast to the otherwise green surroundings. These contrasts would soften and become less noticeable within two or three growing seasons after project completion as the understory component (i.e., grass, aspen and shrubs, etc.) moves in, as singed but not dead trees recover and green up, and as dead standing trees fall down. Effects may last longer and be more pronounced in areas of moderate to high fire severity, but these areas would be localized and limited. Repeat burning would temporarily blacken the forest floor, some charred bark, and scorch or burn of some understory trees and shrubs. These effects typically soften after one year, and are less noticeable to the casual observer after 2 to 3 years.

Smoke from pile burning and prescribed burning creates short term and temporary effects on scenic quality. During implementation, smoke would obscure views of the surrounding terrain and mountains. Effects to residents and visitors in the project areas may be dissatisfaction that their views are obstructed, and scenic features are obscured. Very smoky conditions typically occur during the first entry of prescribed burning due to heavy fuel loadings. There can be lingering smoke for two weeks to a month after burning as stumps, large logs and roots smolder. Smoke from repeat burns should lessen, since less fuel would be consumed.

There may be indirect effects of smoke as well since it drifts and is pushed by air currents. Nearby developed recreation sites, houses and subdivisions, and the communities may experience reduced visibility and smoky conditions. Dispersed campers and other recreationists may experience reduced visibility and smoky conditions in some places near the project area.

Transportation System. Transportation systems used under all action alternatives would utilize a combination of existing Forest Service system roads, Forest Service system roads that are relocated to reduce erosion, previously decommissioned roads, new temporary roads and temporary roads that would be placed on existing road prisms. The approximately 4.38 miles of roads that are no longer needed for management of national forest lands would also be decommissioned under this EIS.

The Coconino National forest is concurrently conducting an environmental analysis of non-motorized recreation for trails, special uses and facilities in the Mt. Elden-Dry Lake Hills (MEDL) area. Much of MEDL planning area overlaps with the FWPP project area. There is the possibility that new temporary roads constructed under the FWPP could at a later time be converted to recreational trails. The EIS currently being prepared for FWPP will not analyze for the possible environmental effects of any future road to trail conversion within the project area. It will only analyze for the construction, use and rehabilitation of new temporary roads, not their possible conversion to a trail. If any road to trail conversion is considered under the MEDL environmental assessment, those environmental effects would be analyzed under the MEDL environmental assessment. In the FWPP project, three roads (about two miles total) would be partially relocated for use as haul routes for log trucks and eliminate overly steep grades. The unused road prisms would be restored.

Road maintenance activities would improve the condition of the existing road system, and this would be beneficial for scenery. Relocation of segments of existing roads would add new unnatural linear features into the landscape. Trees would be removed, soil exposed, and roadbeds constructed including drainage features. The old road alignments were very steep and relocation would also have beneficial effects on scenery since they would follow more natural contour lines when completed. In addition the former roadbed segments would be restored.

Construction of approximately 18 miles of temporary roads would result in extensive short term effects on scenery. Effects are similar to road relocation noted above, although the temporary roads would be restored after use. Design features would be used to close entrance points and Best Management Practices for watershed would ensure drainage is re-established and the roads can rehabilitate. The temporary roads would begin to recover and should be mostly recovered and less noticeable to the casual observer in 5 to 10 years after the project is completed, and the roads are rehabilitated. Figure 19 provides an example of an active temporary road and a temporary road 5 years after restoration. These photos are taken at different locations. Some roads may take longer to fully revegetate and others may take a shorter amount of time.

Figure 20 Active temporary road (Coconino NF).



Figure 21 A temporary road five years following rehabilitation (Coconino NF).



Road decommissioning of 4 miles of roads would entail obliteration whereby road surfaces may undergo some or all of the following actions: rip and seed or mulched with slash, inside ditches filled, road prisms outsloped, culverts and fill materials removed, stream crossings re-contoured, unstable sidecast or cutslopes removed or stabilized, and entrances blocked to prevent future access. These would have moderate short term effects to scenery. Design features would help assure these roads to a more stable status. The obliterated roads would begin to recover after treatment and would be mostly recovered and less noticeable to the casual observer in 5 to 10 years.

Alternative 2 – Proposed Action

In addition to effects common to the action alternatives noted above, alternative 2 proposes to use mechanical treatments on steep slopes using cable logging systems.

Skyline Yarding: Skyline yarding uses a system of cables per the diagram in Figure 21 to drag logs or whole trees from the cutting unit to a roadside landing. It is used on sites that are too steep for ground based operations.

A skyline yarder like the one shown in Figure 22 remains stationary on a road and supplies the power to operate the cables which pull in the harvested stems. The yarder also contains the drums on which the cables are stored. A tower on the yarder provides partial lift for the logs so that they better clear obstacles.

A skyline is strung from the yarder and anchored to a tailhold at the bottom of the cutting unit. Roughly parallel “corridors” for the skyline needs to be placed every 100’ to 140’. These corridors are approximately 12’ wide and must have all trees removed from them to facilitate yarding. Logs are laterally yarded to this corridor and are then hauled up the skyline to the landing.

Trees can be mechanically cut if the ground conditions allow for feller-bunchers or harvesters to operate on it, otherwise felling is done hand with chainsaws. Yarding is nearly always done uphill against gravity as this allows for the logs to remain under control of the yarder. Downhill yarding is very difficult in partial cuttings such as thinning and requires a yarder with additional capability. Downhill yarding results in significantly greater stand damage and safety issues.

Skyline yarding is not limited by slope. If whole trees are yarded to the landing, a processor can manufacture the stem into logs just as in conventional ground based operations. A loader also loads the logs onto trucks for transport.

Figure 22 Drawing of skyline yarding system.

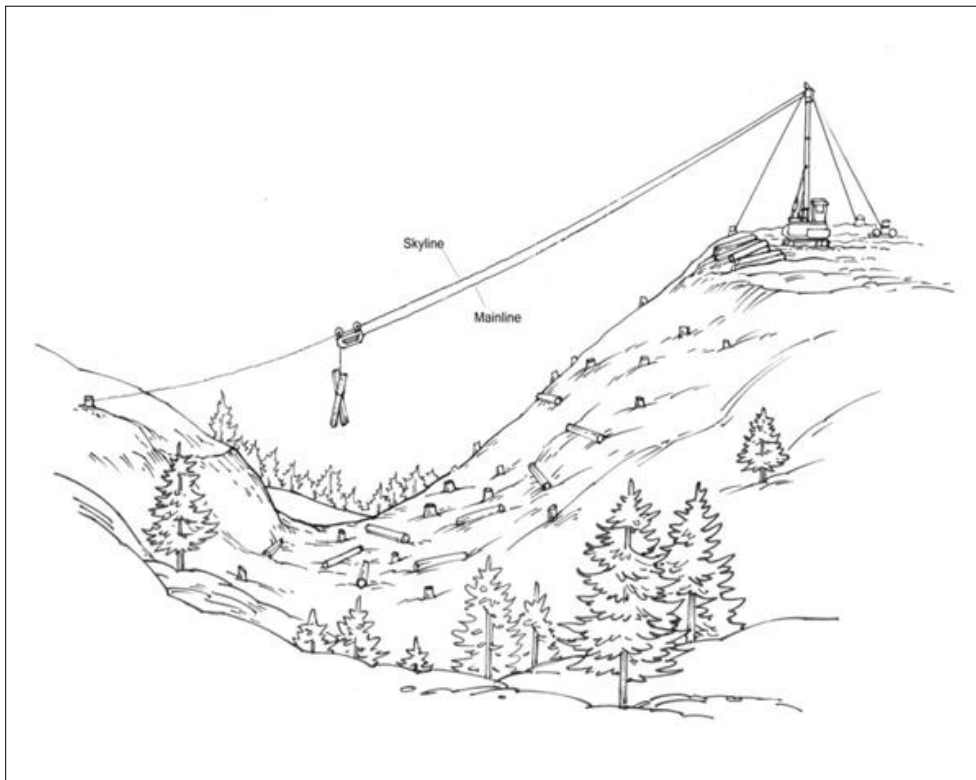


Figure 23 Skyline yarder in operation.



A variation of skyline yarding involves a machine referred to as an Excaliner. These are excavators that have been converted for use as a skyline yarder as shown in Figure 23. They are capable of operating off of constructed roads and yard timber up to the top of steep areas that a conventional yarder, which must remain on the road, would not be capable of accessing. Yarded timber is then skidded to a roadside landing with a rubber-tired skidder.

Figure 24 Excaliner yarding logs uphill.



Cable systems are used to transport cut logs to centralized processing areas and typically have extensive, short term effects to scenery. Trees are cut and limbed, and then cables pull the trees to the landing area. Many cut trees are transported along a common corridor which can be up to 1000 feet long and are about 12 feet wide. In order to remove trees in a large area, corridors

would be established about every 100 to 140 feet. Effects typically include scraping and loss of limbs on remaining trees as a result of adjacent trees being felled or transported, creation of linear corridors, slash, creation of large, cleared landings where logs are decked and equipment can be accommodated (moved and turned). Following log removal, activity slash must be treated. Methods may include bunching and piling slash mechanically which can trample vegetation and cause bare soil to be exposed, hand piling, and lopping and scattering.

1. What are the potential impacts to scenic resources as a result of implementation due to the highly valued viewsheds contained within the project area?

Measure: Comparison of existing scenic character to desired scenic character (descriptive). Scenic character descriptions encompass both ecological components and cultural values. Existing scenic character provides a baseline to compare the anticipated changes from the proposed action and whether this will make progress toward the desired scenic character.

The project area's dominant scenic character is the almost continuous conifer forest with some rocky outcrops overlaying moderate to steeply sloping volcanic landforms. The project areas are viewed from the foreground, middleground and background from roads and trails. Grassland openings less than 5 acres in size are difficult to distinguish due to dense vegetation, but some do exist. Other scenery attributes include volcanic rocks and outcrops of all sizes. Seasonal changes including reliable winter snowfall accents the scenery as do wildlife sightings of birds and mammals. Research shows that such diversity of scenery attributes supports a positive viewing experience for people traveling through or recreating within the project area, and supports the quality of life for local residents and visitors (Ryan 2005).

Vegetation and landform both offer significant opportunities for scenery. The steep slopes of the Dry Lake Hills and Mormon Mountain make them a dramatic landscape features. Rocky outcrops and formations contribute to the unique identity of the mountain, and contribute to the complexity of planning management activities that may occur there. The vegetation carpets the landscape and provides the character of the area. There are also significant risks present in these landscapes due to the density of the forest, lack of fire, high quantities of fuels and steepness of the topography.

Alternative 2 would treat about 85% of the 10,544 acre project area. The treatments involving mechanical treatments and prescribed fire would make the most progress over the next 20 years toward fuels reduction and the desired scenic character, and follow up burning would help to maintain gains made by the treatments. These long term gains would assure the desired scenic character is maintained. Mixed conifer treatments and burning would make more short term gains in scenic character because there is no follow up burning proposed. The short term gains would make some progress toward maintaining the desired scenic character. Treatments for Mexican Spotted Owl and goshawk nest cores will show less progress toward meeting fuels reduction and desired scenic character due to specific wildlife habitat requirements. Much of the ponderosa pine and mixed conifer forest would be more resilient and would more closely resemble historic conditions. Uneven aged groups of trees of all age and size classes would be better represented. Under represented old, mature trees would be retained and new trees would be recruited to help meet the deficit. It is anticipated that there would be improvement in understory vegetation in all areas receiving treatment, but the mechanically treated and burned areas are expected to improve the most (Noble 2011). Stream course channels would have a more diverse and healthy understory that would help protect them if wild fires do occur. The existing road system would be maintained, about 4 miles of roads would be decommissioned and all temporary roads would be rehabilitated.

Measure: Description of expected disturbance and duration of disturbance upon completion of the project (years).

The short term effects common to all action alternatives have been described earlier, as well as specific actions described above for skyline yarding in Alternative 2. These provide information about expected short term effects during implementation. Project implementation may take at least ten years, but not all areas will be treated at the same time. Table 5 provides an estimate of the expected time post implementation for the desired landscape character features of the scenery to recover and improve.

Table 5 Estimated scenic recovery times by treatment type

Treatment Type	Acres	Estimated Recovery Time Post Implementation		
		1-3 years	3-5 years	5-10 years
Aspen	22 hand cut/pile		X*	X*
Burn Only	270 burn only	X		
Electronic Site	18 ground based	N/A**		
Goshawk Nest Fuels Reduction	100 ground based		X	
Goshawk PFA Fuels Reduction	60 cable 299 ground based		X	X
Grassland Restoration	60 ground based	X		
Mixed Conifer Fuels Reduction	514 cable 626 ground based		X	X
Mixed Conifer Fuels Reduction - Hand Thin	132 hand cut/pile	X		
MSO Nest Fuels Reduction - Burn Only	663 burn only	X		
MSO Nest Fuels Reduction - Hand Thin	122 hand cut/pile	X		
MSO Nest Roost Recovery - Burn Only	37 burn only	X		
MSO Nest Roost Recovery - Hand Thin	99 hand cut/pile	X		
MSO PAC Fuels Reduction	432 cable 2312 ground based 15 treat in place	X	X	X
MSO PAC Fuels Reduction - Hand Thin	202 hand cut/pile	X		
MSO PAC Fuels Reduction - Wet Mixed Conifer	33 cable 147 hand cut/pile	X		X
Ponderosa Pine Fuels Reduction	252 cable 2370 ground based		X	X
Ponderosa Pine Fuels Reduction - Hand Thin	150 hand cut/pile	X		

*Dependent upon treatment type and if fencing is used. Fencing effects are longer lasting because trees must grow to an adequate size to withstand ungulate browsing. **Existing structure and facilities will keep the SIO at moderate.

2. Will progress be made toward desired scenic integrity objectives and scenic stability?

Measure: Comparison of projected progress toward scenic stability and scenic integrity (acres).

The scenic integrity objective is the degree to which the landscape is free from visible disturbances that detract from the natural or socially valued appearance. As noted in the proposed forest plan revision, vegetation treatments should contribute toward the scenic integrity of the desired landscape character (Forest Service 2013). The scenic integrity objectives map was presented earlier in Figure 5 and Figure 6.

Approximately 87% of the project area at Dry Lake Hills is mapped with a high scenic integrity objective, and about 73% of Mormon Mountain is mapped as high. This alternative would have the most short term negative effects to scenery due use of the cable logging system in about 20% of the Dry Lake Hills area and about 3% of the Mormon Mountain area. The cable corridors created would introduce linear elements up and down the slopes. The corridors would occur about every 12 feet. Since these logging systems have not been used locally, it is difficult to predict how the areas will recover. In background views, it would be more difficult to distinguish the cable corridors since the existing patterns of vegetation and large rock outcrops already create irregular patterns in the landscape. In middleground views, it will be easy to distinguish the linear corridors shapes of individual trees, openings and rock outcrops. In the foreground, the corridors are very obvious.

The next set of photos show examples of cable logging corridors from vegetation management projects in Montana. The first photo (Figure 24) shows a corridor in mixed conifer or spruce-fir vegetation soon after harvest in a foreground view. Figures 25 shows cable corridors in a middle ground view. Figures 26 through 29 show before and after photos in different seasons.. It is anticipated recovery could take five to ten years and possibly longer until the tree canopies close so that the linear corridors are not as obvious. In the foreground, disturbance to the individual trees, branches and understory plants would be visible. The corridors will be more obvious.

Figure 25 Cable corridor in foreground view.



Figure 26 Cable corridors in middleground view.



Figure 27 Middleground photo setting before cable harvesting begins.



Figure 28 Before cable harvesting begins.



Figure 29 One year after cable harvesting in winter.



Figure 30 Summer two years after cable harvesting.

The overall scenic integrity for the entire project will be lowered during and for five to ten years following project implementation. Interim measures will be used during implementation activities

whereby the in high scenic integrity areas, approximately 8203⁴ acres, will drop to moderate until project completion and for 5 to 10 years following. All of the cable treatment acres are in high scenic integrity objective areas. Burn only, hand thin and pile would be expected to recover fastest and cable logged areas the slowest. The 1311 acres of the projects that are already moderate SIO will not require interim measures. Following implementation there will be improvement in the scenic integrity of the areas with a moderate objective.

The scenic stability determination finds that of the scenery attributes selected and evaluated for the existing condition, four are at high risk and two are at moderate risk. This would mean that there is HIGH risk to MOST attributes and FEW are stable. For this project scenic stability is VERY LOW. Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained. Assuming hand and mechanically treated areas would have piles burned and there would be follow up prescribed fire, these conclusions can be made:

Following recovery, there will be improvement in the scenic stability and scenic integrity of most areas as indicated in Table 6. The main exception is the electronic sites where the existing structures and facilities will keep these areas at a moderate scenic integrity. There will be less improvement in scenic stability in MSO nest and roost areas and potentially in goshawk nest cores because specific wildlife habitat requirements. There may also be slightly less improvement in the mixed conifer areas because repeat burns are not planned. Other areas would show improved scenic stability especially with return burns. The existing road system used for hauling timber and/or biomass would be maintained and stable. Four miles of decommissioned roads would be stabilized and be restored, improving scenic stability and scenic integrity. Temporary roads used for implementation would be restored. Over time this would maintain or improve scenic stability and scenic integrity.

Table 6 Projected improvements in scenic stability and scenic integrity for the Dry Lake Hills and Mormon Mountain areas.

Treatment Type	Acres	Projected Scenic Stability Improvement		Projected Scenic Integrity Improvement	
		Acres	Percent of project area	Acres	Percent
Aspen	22 hand cut/pile	22	<1%	22	<1%
Burn Only	270 burn only	270	3%	270	3%
Electronic Site	18 ground based	18	<1%	0*	
Goshawk Nest Fuels Reduction	100 ground based	100 but less than other areas due to wildlife habitat requirements	1%	100 but less than other areas due to wildlife habitat requirements	1%
Goshawk PFA Fuels Reduction	60 cable 299 ground based	359	4%	359	4%
Grassland Restoration	60 ground based	60	<1%	60	<1%

⁴ Project areas total acres minus no treatment

Mixed Conifer Fuels Reduction	514 cable 626 ground based	1140 may be less than other areas due to lack of repeat burns	<14%	1140 may be less than other areas due to lack of repeat burns	<14%
Mixed Conifer Fuels Reduction - Hand Thin	132 hand cut/pile	132 may be less than other areas due to lack of repeat burns	<2%	132 may be less than other areas due to lack of repeat burns	<2%
MSO Nest Fuels Reduction - Burn Only	663 burn only	663 but less than other areas due to wildlife habitat requirements	<8%	663 but less than other areas due to wildlife habitat requirements	<8%
MSO Nest Fuels Reduction - Hand Thin	122 hand cut/pile	122 but less than other areas due to wildlife habitat requirements	<1%	122 but less than other areas due to wildlife habitat requirements	<1%
MSO Nest Roost Recovery - Burn Only	37 burn only	37 but less than other areas due to wildlife habitat requirements	<1%	37 but less than other areas due to wildlife habitat requirements	<1%
MSO Nest Roost Recovery - Hand Thin	99 hand cut/pile	99 but less than other areas due to wildlife habitat requirements	<1%	99 but less than other areas due to wildlife habitat requirements	<1%
MSO PAC Fuels Reduction	432 cable 2312 ground based 15 treat in place	2759	34%	2759	34%
MSO PAC Fuels Reduction - Hand Thin	202 hand cut/pile	202 but less than other areas due to wildlife habitat requirements	<3%	202 but less than other areas due to wildlife habitat requirements	<3%
MSO PAC Fuels Reduction - Wet Mixed Conifer	33 cable 147 hand cut/pile	180	2%	180	2%
Ponderosa Pine Fuels Reduction	252 cable 2370 ground	2622	32%	2622	32%

	based				
Ponderosa Pine Fuels Reduction - Hand Thin	150 hand cut/pile	150	2%	150	2%
Existing Road Maintenance and road relocation	17+ miles	Maintain or improve existing conditions	N/A	Maintain or improve existing conditions	N/A
Decommission Roads	4 miles	4 miles	N/A	4 miles	N/A
Temporary Roads	<4 miles	<4 miles	N/A	<4 miles	N/A

*Existing structure and facilities at electronics sites will keep the SIO at moderate

Cumulative Effects

The cumulative effects analysis area is the ponderosa pine forest on the Coconino and Kaibab NF's. The timeline for analysis is 20 years because most long-term effects of the alternatives are assessed out to a 20 year timeframe (with the exception of large scale high severity wildfire which is more difficult to project.) The following is list of actions relating to scenic attributes, landscape character and scenic integrity considered in the cumulative effects analysis for this project:

- Past activities that created the current conditions include grazing, the evolving forest management practices related to timber harvest and fire suppression, drought, disease and insect infestations, developed and dispersed recreational use.
- Present and future activities such as vegetation management, fuels management, utility corridor clearing and new utility corridors, and other management activities (e.g. noxious weeds treatments). These activities could occur on private lands as well.

The cumulative effects of past management activities are visible as the existing conditions. Vegetation management practices, fire suppression, and over grazing have resulted in the current even-aged forest structure, overstocked conditions, sparse understory trees, shrubs, grasses and forbs, conifer encroached meadows and savannas.

The short term cumulative effects (1-5 years) of Alternative 2 combined with similar current and future restoration treatments and prescribed burning projects are expected to be widespread. There will be evidence of restoration treatments, and the scenic quality would be decreased in some places in most of the ponderosa pine on the Coconino and Kaibab NF. For example, in areas where restoration treatments result in skid trails or removal of vegetation for staging areas or log decks, there could be a cumulative impact to scenic attributes where activities such as dispersed recreational use, grazing, or adjunct private land or infrastructure development is also occurring. In general these cumulative impacts to scenic attributes will be localized in scale (1-10 acres) and are most likely to be of short-term duration (1-5 years).

In the long term (5 to 20 years), there would be large and widespread improvement in the health and sustainability of scenic attributes that make up the landscape character of the ponderosa pine forest. Forest users would experience an open forest with tree groups of varying ages, sizes and shapes, large, mature trees, and healthy, diverse understory. In many places, the scenic integrity objectives would be met.

When natural stressors such as wildfires or insect outbreaks occur, or human activities such as new utility corridors, or development of a new recreation site, or a new private subdivision is

developed, the cumulative effects of Alternative 2 and other projects would result in small and localized changes in the scenic character of the ponderosa pine forest. When drought conditions or unusual weather events as a result of climate change occur, the ponderosa pine forest would be healthier and more resilient to such events, thus counteracting the effects of climate change which are likely to detract from scenic attributes. The overall trend from this alternative would be toward improving landscape attributes, and sustainable landscape character.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Forest Plan Amendments

The Coconino National Forest is currently operating under the 1987 Coconino Land Management Plan (Forest Plan), as amended; however the Forest is in the process of revising the Forest Plan, with the Record of Decision (ROD) for the revised plan anticipated for release in early 2015. Depending on the timing of the release of the final Forest Plan document, the final FWPP analysis will be consistent with the revised Forest Plan. The following three project-specific, non-significant Forest Plan amendments would only be required if a decision for this project is signed prior to implementation of the revised Forest Plan. In other words, no Forest Plan amendments would be anticipated if FWPP is implemented under the revised Forest Plan.

Three project-specific, non-significant amendments to the Coconino National Forest Land Management Plan (Forest Plan; 1987, as amended) would be required to implement the proposed action. A site (project) specific plan amendment is a one-time variance in Forest Plan direction for the project; Forest Plan direction reverts back to its original language/direction upon completion of the specified project. The language proposed does not apply to any other forest project.

A revised MSO Recovery Plan, issued by the U.S. Fish and Wildlife Service (FWS) was finalized in December of 2012 (USDI 2012). The current Forest Plan is consistent with the previous MSO Recovery Plan (USDI 1995). For this project, a Forest Plan amendment would be needed to utilize the revised recovery plan direction if it is different than what is currently included in the Forest Plan. The proposed Forest Plan amendments include:

Amendment 1: Adding the desired percentage of openings within uneven-aged stands to facilitate treatments in northern goshawk habitat (excluding nest areas) based on research of historic conditions on the Coconino National Forest, adding language clarifying how canopy cover would be measured, and adding a definition to the Forest Plan glossary for the terms “interspaces,” “open reference condition,” and “stands.” The purpose of this amendment would be to allow restoration treatments to approximate historic conditions in ponderosa pine that facilitated ecological processes such as low-severity wildfire. Restoration treatments with this amendment could be more open than purely fuels-reduction treatments, and therefore are anticipated to further reduce the risk of high-severity wildfire.

Effects to Scenic Resources

Amendment would have a positive effect for the project to improve scenic stability and improve scenic integrity. It would enable better achievement of desired scenic character such as scattered groups of trees with grassy openings between that provide natural contrast and species diversity. A mosaic of openings and groups of trees allows existing scenic views and attributes to be seen. Uneven aged groups of trees – all age and size classes present, but distributed across the landscape in groups and clumps. Different sizes and forms create variety and pattern across the landscape that is characteristic of the ponderosa pine forest and is the dominant visual element.

Uneven aged groups of trees are also desirable in the mixed conifer forests. Forest health is improved resulting in better resilience and forest structure. Scenic attributes are sustainable into the future.

Amendment 2: Modify Forest Plan language to allow mechanical treatments in MSO PACs up to 18 inches dbh and hand thinning treatments up to 9 inches dbh and prescribed burning within MSO nest/cores. The monitoring requirement specified under the Forest Plan would be amended to include the monitoring plan developed by the Forest Service, U.S. Fish and Wildlife Service, and the Rocky Mountain Research Station referenced in the following section titled, “Monitoring.” This amendment would also remove timing restrictions within MSO PACs for the duration of the FWPP project. Treatments within PACs would be accomplished as quickly as possible to reduce the duration of impacts, and would be coordinated with FWS. The purpose of this amendment would be to facilitate treatment in high-priority locations such as Mexican spotted owl occupied habitat to prevent high-severity wildfire. This is based on language in the Mexican Spotted Owl Recovery Plan (2012), which states, “[wildfires] result in the most significant alteration of owl habitat and hence, have the greatest potential for loss of habitat.”

Effects to Scenic Resources

Amendment would have positive effects for many of the desired scenic character attributes as noted above and would improve scenic stability and improve scenic integrity. Since treatments would be coordinated with Fish and Wildlife Service to meet habitat requirements, it would also meet the desired condition of large old mature trees are a prominent component of the uneven aged forest. The form and shape of large trees and presence of a mature forest structure is critical to the landscape character of the ponderosa pine and mixed conifer types.

Amendment 3: Removing language restricting mechanical equipment to slopes less than 40 percent and language identifying slopes above 40 percent as inoperable. This amendment would allow mechanical harvesting on slopes greater than 40 percent within the project area.

It would be necessary to allow for use of specialized mechanical equipment to cut and remove trees on steep slopes to reduce the risk of high-severity wildfire in this project area due to the preponderance of areas with greater than 40 percent slope in the project area. Furthermore, since the Forest Plan was written and amended, mechanized ground-based equipment has progressed to be able to operate on steep slopes more effectively. While this specialized equipment is not commonplace in this region due to the high cost of its use, the approval of the City bond makes the use of such equipment a possibility for this project. In order to be able to utilize such equipment to treat slopes above 40 percent in the project area and meet the purpose and need, this Forest Plan amendment is needed.

Effects to Scenic Resources

Use of specialized equipment would have short term negative effects to scenery, but would enable much more treatment of vegetation than the current limits in the Forest Plan. Over the long term (10-20 years) there would be more improvement to scenic stability if the specialized equipment were able to operate on greater than 40 percent slopes than not. Since so much of the project areas are departed from historic conditions and at high risk from stressors including wildfire, intensive weather events, climate change and insects and disease these more intensive management actions are needed (Guido 2011). Scenic integrity would be maintained or improved over the long term as well.

Alternative 3 – Proposed Action

Alternative 3 would include the effects common to all alternatives and all action alternatives and would employ helicopter yarding.

Helicopter Yarding: Trees are felled either by hand or mechanically and then lifted free of the ground with a helicopter equipped with a 150-200' long line similar to that shown in Figure 22 and flown to a roadside landing. Either logs or whole trees may be removed. However, flying whole trees with limbs and tops attached can significantly raise logging cost, as limbs and tops have little to no commercial value and are expensive to fly. Helicopter yarding is an extremely expensive method due to the high cost of operating a helicopter. If whole trees are flown, the tree is processed at the landing area with a processor.



Helicopter systems transport logs or trees to central log decks. Helicopter logging typically has moderate effects on scenery. Trees are typically cut and limbed leaving slash behind, but it is possible to transport whole trees. Logs would have cables attached, then would be lifted up and transported away from the cutting area to central locations (log decks) where the logs are detached from the cables. If whole trees are transported, they must be limbed at the log deck creating very large quantities of slash. Equipment such as grapplers are used at the log decks to stack logs and load them into trucks for transport. Effects include scraping and loss of limbs on existing trees as a result of adjacent trees being felled or transported, creation of large, cleared landings where slash may be piled, logs are decked and equipment can be accommodated (moved and turned) and helicopters can be landed. Following log removal, activity slash must be treated which may include bunching and piling mechanically which can trample vegetation and cause bare soil to be exposed, hand piling, and lopping and scattering. The effects of slash treatment are short term depending on how slash is treated. Hand piling creates noticeable piles, but after these are burned, there is a shorter recovery time than with mechanical piling. Lop and scatter results in untreated slash since it is allowed to remain in an area until it is burned. Ryan (2005) found this is not as acceptable as when slash is treated either by chipping or piling. Mechanical piling may include bulldozers pushing slash into large piles which can trample vegetation and cause bare soil to be exposed. When these large piles are burned the soil can be sterilized lengthening the time needed for the burned areas to rehabilitate.

1. What are the potential impacts to scenic resources as a result of implementation due to the highly valued viewsheds contained within the project area?

Measure: Comparison of existing scenic character to desired scenic character (descriptive). Scenic character descriptions encompass both ecological components and cultural values. Existing scenic character provides a baseline to compare the anticipated changes from the proposed action and whether this will make progress toward the desired scenic character.

The project area's dominant scenic character is the almost continuous conifer forest with some rocky outcrops overlaying moderate to steeply sloping volcanic landforms. The project areas are viewed from the foreground, middleground and background from roads and trails. Grassland openings less than 5 acres in size are difficult to distinguish due to dense vegetation and encroachment, but some do exist. Other scenery attributes include volcanic rocks and outcrops of all sizes. Seasonal changes including reliable winter snowfall accents the scenery as do wildlife sightings of birds and mammals. Research shows that such diversity of scenery attributes supports a positive viewing experience for people traveling through or recreating within the project area, and supports the quality of life for local residents and visitors (Ryan 2005).

Vegetation and landform both offer significant opportunities for scenery. The steep slopes of the Dry Lake Hills and Mormon Mountain make them a dramatic landscape features. Rocky outcrops and formations contribute to the unique identity of the mountain, and contribute to the complexity of planning management activities that may occur there. The vegetation carpets the landscape and provides the character of the area. There are also significant risks present in these landscapes due to the density of the forest, lack of fire, high quantities of fuels and steepness of the topography.

Alternative 3 would treat about 90% of the 10,544 acre project area. Many of the treatments would make progress over the next 20 years toward fuels reduction and the desired scenic character, and follow up burning in the ponderosa pine would help to maintain gains made by the treatments. Treatments for Mexican Spotted Owl and goshawk nest cores will show less progress toward meeting fuels reduction and desired scenic character due to specific wildlife habitat requirements. Much coniferous forest would be more resilient and would more closely resemble historic conditions, although lack of follow up burning in the mixed conifer vegetation will result in less progress toward the desired scenic character. Uneven aged groups of trees of all age and size classes would be better represented. Under represented old, mature trees would be retained and new trees would be recruited to help meet the deficit. Stream course channels would have a more diverse and healthy understory that would help protect them if wild fires do occur. The existing road system would be maintained, about 4 miles of roads would be decommissioned and all temporary roads would be restored. These actions would maintain or improve scenic stability and scenic integrity.

Measure: Description of expected disturbance and duration of disturbance upon completion of the project.

Overall scenic integrity will be lowered for a shorter time during and for about five years following project implementation. Interim measures will be used during implementation activities whereby the in high scenic integrity areas, approximately 6481 acres, will drop to moderate until project completion and for about 5 years following. Burn only, hand thin and pile and burn only would be expected to recover fastest and the steep slope and helicopter yarded (depending upon whether whole tree or log transit is used) areas the slowest. See Table 7 for an estimate of recovery time by treatment type. This will ensure adequate time for closed and decommissioned roads to naturalize, evidence of logging activities to recover, trailside vegetation to re-establish and initial prescribed fire activities to soften. The 1311 acres of the projects that are already moderate SIO will not require interim measures.

Table 7 Estimated recovery time by treatment type for the Dry Lake Hills and Mormon Mountain areas.

Treatment Type	Acres	Estimated Recovery Time Post Implementation		
		1-3 years	3-5 years	5-10 years
Aspen	22 hand cut/pile		X*	X*
Burn Only	270 burn only	X		
Electronic Site	18 ground based	N/A**		
Goshawk Nest Fuels Reduction	100 ground based		X	
Goshawk PFA Fuels Reduction	39 helicopter 320 ground based		X*** X	
Grassland Restoration	60 ground based	X		
Mixed Conifer Fuels Reduction	425 helicopter 733 ground based		X X	
Mixed Conifer Fuels Reduction - Hand Thin	85 hand cut/pile	X		
MSO Nest Fuels Reduction - Burn Only	663 burn only	X		
MSO Nest Fuels Reduction - Hand Thin	122 hand cut/pile	X		
MSO Nest Roost Recovery - Burn Only	37 burn only	X		
MSO Nest Roost Recovery - Hand Thin	99 hand cut/pile	X		
MSO PAC Fuels Reduction	267 helicopter 2520 ground based		X X	
MSO PAC Fuels Reduction - Hand Thin	202 hand cut/pile	X		
MSO PAC Fuels Reduction - Wet Mixed Conifer	766 ground based		X	
Ponderosa Pine Fuels Reduction	242 helicopter 2389 ground based		X X	
Ponderosa Pine Fuels Reduction - Hand Thin	150 hand cut/pile	X		

*Dependent upon treatment type and if fencing is used. Fencing effects are longer lasting because trees must grow to an adequate size to withstand ungulate browsing. **Existing structure and facilities will keep the SIO at moderate. ***If slash is left on site and has to be gathered into slash piles, there would be longer recovery time (closer to 5 years)

2. Will progress be made toward desired scenic integrity objectives?

Measure: Measure: Comparison of projected progress toward scenic stability and scenic integrity (acres)

The scenic stability determination finds that of the scenery attributes selected and evaluated for the existing condition, five are at high risk and one is at moderate risk. This would mean that there is HIGH risk to MOST attributes and FEW are stable. For this project scenic stability is

VERY LOW. Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.

The scenic integrity or degree to which the landscape is free from visible disturbances that detracts from the natural or socially valued appearance (Forest Service 2007). The majority of both Dry Lake Hills and Mormon Mountain are shown as high scenic integrity, with small amounts of moderate. Minimum scenic integrity is achieved through activities that reduce or minimize visual disturbances in the landscape (Forest Service 2007). This project has extreme fire hazard in most of the area, and it is necessary to move the existing ecosystem conditions towards desired conditions.

This alternative would have the short term negative effects to scenery using ground based treatments and helicopter yarding. There would be fewer effects than with Alternative 2 where cable logging is proposed.

Assuming hand and mechanically treated areas would have piles burned and there would be follow up prescribed fire, these conclusions can be made:

Following recovery, there will be improvement in the scenic integrity of most areas as noted in Table 8. The main exceptions are the electronic sites where the existing structures and facilities will keep these areas at a moderate scenic integrity. There will be less improvement in scenic stability in MSO nest and roost areas and potentially in goshawk nest cores because specific wildlife habitat requirements. There may also be slightly less improvement in the mixed conifer areas because repeat burns are not planned. Other areas would show improved scenic stability especially with return burns. The existing road system used for hauling timber and/or biomass would be maintained and stable. Four miles of decommissioned roads would be stabilized and be restored, improving scenic stability and scenic integrity. Temporary roads used for implementation would be restored. Over time this would maintain or improve scenic stability and scenic integrity. This alternative would result in slightly more improvement in both scenic stability and scenic integrity.

Table 8 Projected improvements in scenic stability and scenic integrity for the Dry Lake Hills and Mormon Mountain areas.

Treatment Type	Acres	Projected Scenic Stability Improvement		Projected Scenic Integrity Improvement	
		Acres	Percent of project area	Acres	Percent
Aspen	22 hand cut/pile	22	<1%	22	<1%
Burn Only	270 burn only	270	3%	270	3%
Electronic Site	18 ground based	18	<1%	0*	
Goshawk Nest Fuels Reduction	100 ground based	100 but less than other areas due to wildlife habitat requirements	1%	100 but less than other areas due to wildlife habitat requirements	1%
Goshawk PFA Fuels	39 helicopter	359	4%	359	4%

Reduction	320 ground based				
Grassland Restoration	60 ground based	60	<1%	60	<1%
Mixed Conifer Fuels Reduction	425 helicopter 733 ground based	1158 may be less than other areas due to lack of repeat burns	<15%	1158 may be less than other areas due to lack of repeat burns	<15%
Mixed Conifer Fuels Reduction - Hand Thin	85 hand cut/pile	85 may be less than other areas due to lack of repeat burns	<1%	85 may be less than other areas due to lack of repeat burns	<1%
MSO Nest Fuels Reduction - Burn Only	663 burn only	663 but less than other areas due to wildlife habitat requirements	<9%	663 but less than other areas due to wildlife habitat requirements	<9%
MSO Nest Fuels Reduction - Hand Thin	122 hand cut/pile	122 but less than other areas due to wildlife habitat requirements	<2%	122 but less than other areas due to wildlife habitat requirements	<2%
MSO Nest Roost Recovery - Burn Only	37 burn only	37 but less than other areas due to wildlife habitat requirements	<1%	37 but less than other areas due to wildlife habitat requirements	<1%
MSO Nest Roost Recovery - Hand Thin	99 hand cut/pile	99 but less than other areas due to wildlife habitat requirements	<1%	99 but less than other areas due to wildlife habitat requirements	<1%
MSO PAC Fuels Reduction	267 helicopter 2520 ground based	2787 but less than other areas due to wildlife habitat requirements	<36%	2787 but less than other areas due to wildlife habitat requirements	<36%
MSO PAC Fuels Reduction - Hand Thin	202 hand cut/pile	202 but less than other areas due to wildlife habitat requirements	<3%	202 but less than other areas due to wildlife habitat requirements	<3%
MSO PAC Fuels	766 ground based	766 but less	<10%	2520 but less	<10%

Reduction - Wet Mixed Conifer		than other areas due to wildlife habitat requirements		than other areas due to wildlife habitat requirements	
Ponderosa Pine Fuels Reduction	242 helicopter 2389 ground based	2631	34%	202	34%
Ponderosa Pine Fuels Reduction - Hand Thin	150 hand cut/pile	150	2%	150	2%
Existing Road Maintenance and road relocation	<18 miles	Maintain or improve existing conditions		Maintain or improve existing conditions	
Decommission Roads	4 miles	4 miles		4 miles	
Temporary Roads	<4 miles	<4 miles		<4 miles	

*Existing structure and facilities will keep the SIO at moderate

Cumulative Effects

Same as Alternative 2.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Same as Alternative 2.

Alternative 4 – Proposed Action

Alternative 4 would have the same effects as those common to all action alternatives. This alternative would be similar to Alternatives 2 and 3; however the purpose of Alternative 4 is to analyze the minimum amount of treatment necessary to meet the purpose and need.

Along the base of Dry Lake Hills and Mount Elden and the upper, flatter tops would receive basically the same treatments proposed in Alternatives 2 and 3. Additionally, treatments are focused on the area south and east of FR420, Spruce Avenue Wash, Schultz MSO PAC and nest core. For Mormon Mountain, same methodology used for treatment placements in the Dry Lake Hills. The wet mixed conifer belt and MSO nest cores would not be treated, however treatments would occur below and above that belt.

1. What are the potential impacts to scenic resources as a result of implementation due to the highly valued viewsheds contained within the project area?

Measure: Comparison of existing scenic character to desired scenic character (descriptive). Scenic character descriptions encompass both ecological components and cultural values. Existing scenic character provides a baseline to compare the anticipated changes from the proposed action and whether this will make progress toward the desired scenic character.

The project area's dominant scenic character is the almost continuous conifer forest with some rocky outcrops overlaying moderate to steeply sloping volcanic landforms. The project areas are viewed from the foreground, middleground and background from roads and trails. Grassland openings less than 5 acres in size are difficult to distinguish due to dense vegetation and

encroachment, but some do exist. Other scenery attributes include volcanic rocks and outcrops of all sizes. Seasonal changes including reliable winter snowfall accents the scenery as do wildlife sightings of birds and mammals. Research shows that such diversity of scenery attributes supports a positive viewing experience for people traveling through or recreating within the project area, and supports the quality of life for local residents and visitors (Ryan 2005).

Vegetation and landform both offer significant opportunities for scenery. The steep slopes of the Dry Lake Hills and Mormon Mountain make them a dramatic landscape features. Rocky outcrops and formations contribute to the unique identity of the mountain, and contribute to the complexity of planning management activities that may occur there. The vegetation carpets the landscape and provides the character of the area. There are also significant risks present in these landscapes due to the density of the forest, lack of fire, high quantities of fuels and steepness of the topography.

Alternative 4 would treat about 62% of the 10,544 acre project area. The areas treated would make the least progress over the next 20 years toward fuels reduction and the desired scenic character, and follow up burning would help to maintain gains made by the treatments. Treatments for Mexican Spotted Owl and goshawk nest cores will show less progress toward meeting fuels reduction and desired scenic character due to specific wildlife habitat requirements. About 62% of the coniferous forest would be more resilient and would more closely resemble historic conditions, although lack of repeat burning in mixed conifer forests would make less progress toward scenic stability. In these places uneven aged groups of trees of all age and size classes would be better represented. Under represented old, mature trees would be retained and new trees would be recruited to help meet the deficit. Stream course channels in treated areas would have a more diverse and healthy understory that would help protects them if wild fires do occur.

Approximately 5800 acres would not be treated (includes about 1600 acres in the Orion Timber Sale that would not receive additional treatment and the no treatment areas of rock and the pipeline). The remaining almost 4200 acres would stay in the existing condition.

The existing road system would be maintained, about 4 miles of roads would be decommissioned. and all temporary roads would be restored. These actions for roads would maintain or improve scenic stability and scenic integrity.

Measure: Description of expected disturbance and duration of disturbance upon completion of the project.

Although this alternative would make the least progress toward the purpose and need, there would be less disturbance and fewer short term negative effects with this alternative than with either alternatives 2 or 3. Table 9 shows the estimated time needed post implementation.

Table 9 Estimate of recovery time following implementation.

Treatment Type	Acres	Estimated Recovery Time Post Implementation		
		1-3 years	3-5 years	5-10 years
Aspen	2 hand cut/pile		X*	X*
Burn Only	67 burn only	X		
Electronic Site	18 ground based	N/A**		

Goshawk Nest Fuels Reduction	100 ground based		X	
Goshawk PFA Fuels Reduction	286 ground based		X	
Grassland Restoration	53 ground based	X		
Mixed Conifer Fuels Reduction	542 ground based		X	
Mixed Conifer Fuels Reduction - Hand Thin	0 hand cut/pile			
MSO Nest Fuels Reduction - Burn Only				
MSO Nest Fuels Reduction - Hand Thin	122 hand cut/pile	X		
MSO Nest Roost Recovery - Burn Only	0 burn only			
MSO Nest Roost Recovery - Hand Thin				
MSO PAC Fuels Reduction	2160 ground based		X	
MSO PAC Fuels Reduction - Hand Thin	228 hand cut/pile	X		
MSO PAC Fuels Reduction - Wet Mixed Conifer	766 ground based		X	
Ponderosa Pine Fuels Reduction	2166 ground based		X	
Ponderosa Pine Fuels Reduction - Hand Thin	86 hand cut/pile	X		

2. Will progress be made toward desired scenic integrity objectives?

Measure: Comparison of projected progress toward scenic stability and scenic integrity (acres)

The scenic stability determination finds that of the scenery attributes selected and evaluated for the existing condition, five are at high risk and one is at moderate risk. This would mean that there is HIGH risk to MOST attributes and FEW are stable. For this project scenic stability is VERY LOW. Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.

The scenic integrity or degree to which the landscape is free from visible disturbances that detracts from the natural or socially valued appearance (Forest Service 2000). The majority of both Dry Lake Hills and Mormon Mountain are shown as high scenic integrity, with small amounts of moderate. Minimum scenic integrity is achieved through activities that reduce or minimize visual disturbances in the landscape (Forest Service 2000). This project has extreme fire hazard in most of the area, and it is necessary to move the existing ecosystem conditions towards desired conditions.

This alternative would make the least progress toward scenic stability, but would have the least short term negative effects to scenery using ground based treatments. There would be fewer effects than with Alternative 2 where cable logging is proposed or 3 where helicopter yarding would be used.

Overall scenic integrity will be lowered for about the same over durations, but implementation would take less time. Interim measures will be used during implementation activities whereby the in high scenic integrity areas, approximately 5677⁵ acres, will drop to moderate until project completion and for about 5 years following. Hand thin and pile and burn only would be expected to recover fastest and the steep slope and ground based conventional logged areas the slowest. See Table 7 for an estimate of recovery time by treatment type. This will ensure adequate time for closed and decommissioned roads to naturalize, evidence of logging activities to recover, trailside vegetation to re-establish and initial prescribed fire activities to soften. The about 670 acres of the projects that are already moderate SIO will not require interim measures.

Assuming hand and mechanically treated areas would have piles burned and there would be follow up prescribed fire, these conclusions can be made:

Following recovery, there will be improvement in the scenic integrity in about 62% of the area. The remaining area would remain at existing conditions. The main exceptions are the electronic sites where the existing structures and facilities will keep these areas at a moderate scenic integrity. There will be no improvement in scenic stability in MSO nest and roost areas and less improvement in goshawk nest cores because specific wildlife habitat requirements. There may also be about half the improvement in the mixed conifer areas in addition to these areas not receiving repeat burns. Other areas would show improved scenic stability especially with return burns.

The main difference in this alternative is that the scenic stability, already very low would only be improved in about 62% of the area. The remaining almost 4200 acres would show no improvement at all.

Scenic integrity would be improved in about 62% of the area as shown in Table 9. On about 4200 acres, the scenic integrity would be maintained in the short term but would begin to deteriorate in the long term. While strategic placement of treatments would help to mitigate wild fire starts, there would still be a distinct possibility of wild fire with the as noted in the existing condition.

The existing road system used for hauling timber and/or biomass would be maintained and stable. Four miles of decommissioned roads would be stabilized and be restored, improving scenic stability and scenic integrity. Temporary roads used for implementation would be restored. Over time this would maintain or improve scenic stability and scenic integrity. This alternative would result in slightly more improvement in both scenic stability and scenic integrity.

Table 10 Projected improvements in scenic stability and scenic integrity in the Dry Lake Hills and Mormon Mountain areas.

Treatment Type	Acres	Projected Scenic Stability Improvement		Projected Scenic Integrity Improvement	
		Acres	Percent of	Acres	Percent

⁵ Project areas total acres minus no treatment

			project area		
Aspen	2 hand cut/pile	2	<1%	2	<1%
Burn Only	67 burn only	67	<1%	67	<1%
Electronic Site	18 ground based	18	<1%	0*	
Goshawk Nest Fuels Reduction	100 ground based	100 but less than other areas due to wildlife habitat requirements	1%	100 but less than other areas due to wildlife habitat requirements	1%
Goshawk PFA Fuels Reduction	286 ground based	286	4%	286	4%
Grassland Restoration	53 ground based	53	<1%	53	<1%
Mixed Conifer Fuels Reduction	542 ground based	542 may be less than other areas due to lack of repeat burns	<8%	542 may be less than other areas due to lack of repeat burns	<8%
Mixed Conifer Fuels Reduction - Hand Thin	0	0	0	0	0
MSO Nest Fuels Reduction - Burn Only	0	0	0	0	0
MSO Nest Fuels Reduction - Hand Thin	122 hand cut/pile	122 but less than other areas due to wildlife habitat requirements	<2%	122 but less than other areas due to wildlife habitat requirements	<2%
MSO Nest Roost Recovery - Burn Only	0	0	0	0	0
MSO Nest Roost Recovery - Hand Thin	0	0	0	0	0
MSO PAC Fuels Reduction	2160 ground based	2760 but less than other areas due to wildlife habitat requirements	<36%	2760 but less than other areas due to wildlife habitat requirements	<36%
MSO PAC Fuels Reduction – Burn Only	33 burn only	33 but less than other areas due to wildlife habitat requirements	<1%	33 but less than other areas due to wildlife habitat requirements	<1%
MSO PAC Fuels Reduction - Hand Thin	228 hand cut/pile	228 but less than other areas due to wildlife	<3%	228 but less than other areas due to wildlife	<3%

		habitat requirements		habitat requirements	
MSO PAC Fuels Reduction - Wet Mixed Conifer	766 ground based	766 but less than other areas due to wildlife habitat requirements	<10%	2520 but less than other areas due to wildlife habitat requirements	<10%
Ponderosa Pine Fuels Reduction	2166 ground based	2166	33%	2166	33%
Ponderosa Pine Fuels Reduction - Hand Thin	86 hand cut/pile	86	<1%	86	<1%
Existing Road Maintenance and road relocation	<18 miles	Maintain or improve existing conditions		Maintain or improve existing conditions	
Decommission Roads	4 miles	4 miles		4 miles	
Temporary Roads	<4 miles	<4 miles		<4 miles	

*Existing structure and facilities at electronics sites will keep the SIO at moderate

Cumulative Effects

Same as Alternatives 2 and 3 but somewhat lesser effects.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Same as Alternative 2 and 3.

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Appendix A

Scenic Stability Assessment

This assessment follows the guidance from Appendix J (Recommended SMS Refinements, 2007) of the Landscape Aesthetics: A Handbook for Scenery Management (FS 2000).

Introduction

Scenic Stability considers the condition of the valued scenery attributes identified in the scenic character description of the Flagstaff Watershed Protection Project. It evaluates whether their condition is within the historic range of variability reference conditions, the range of conditions that indicate a properly functioning ecosystem. For example, the forest vegetation related scenic attributes (stand structure/density, species composition, fire return interval, etc) give an indication of whether the ecosystem is functioning properly and if the scenic attributes can be sustained.

Scenic Stability also considers stressors that can affect scenery such as wildfire, insects and disease, and infestations of noxious weeds. Stressors may not threaten scenic attributes when the forest is functioning within reference conditions, but may become detrimental when the forest functions outside of these ranges.

The objective of the project is to use mechanical thinning and prescribed burning on the National Forest to reduce the threat of high severity wildfire and subsequent flooding in two key areas near the City of Flagstaff, Arizona: the Dry Lake Hills portion of the Rio de Flag Watershed north of Flagstaff, and the Mormon Mountain portion of the Upper Lake Mary Watershed south of Flagstaff. The fuels reduction treatments proposed under this project would have effects similar to re-establish forest structure, pattern, and composition, within the ponderosa pine ecosystem which will lead to increased forest resiliency and function. Resiliency increases the ability of the ponderosa pine forest to survive natural disturbances such as insect and disease, fire, and climate change (FSM 2020.5). Other benefits of the proposed treatments include putting the project area on a trajectory towards comprehensive, landscape-scale restoration with benefits that include improved vegetation biodiversity, wildlife habitat, soil productivity, and watershed function.

The Flagstaff Watershed Protection Project will compare scenic stability and potential results from the proposed actions in the scenery specialist report.

Method

Scenic Stability uses a descriptive six level rating scale from Very High Stability to No Stability to identify the degree to which the scenic attributes of the valued scenic character are likely to be perpetuated within the ecosystem. The highest scenic stability ratings indicate resilient ecosystems that are functioning within their reference conditions. These would also be places where all scenic character attributes are present and likely to be sustained into the future. The individual scenery attribute risk determination guidelines, noted in Table 1, are used to rate the likelihood that valued scenery attributes will be maintained. Lower scenic stability ratings indicate areas where intensive vegetation management practices to begin to restore ecosystem health and function could also benefit scenery by restoring and/or maintaining valued attributes of scenic character. Areas of higher scenic stability need less intensive management activities to maintain their valued scenic character attributes.

Table 1. Individual scenery attribute risk determination guidelines.

Scenery Attribute Condition	Ecosystem Stress On Scenery Attribute			
		MINOR	MODERATE	SEVERE
	STRONG	No Risk	Low Risk	Moderate Risk
	FAIR	Low Risk	Moderate Risk	High Risk
	POOR	Moderate Risk	High Risk	High Risk

Assessment of scenic stability involves determining ecological risks and effects on valued scenery attributes based on known conditions and stressors that exist. The assessment will evaluate dominant, stable and vulnerable scenery attributes identified for the project. Evaluation of one or more dominant scenery attributes should be part of every Scenic Stability assessment; minor scenery attributes can be included if applicable.

Determination of the scenic stability level involves combining each of the individual scenery attributes into a single scenic stability level for the analysis area. Table 2 guides the combining and rating process. The most appropriate risk box will describe risks that are equal to or greater than the closest to the combined individual scenery attribute risks.

Table 2. Scenic Stability Level Determination

Ecosystem Risk ⁶ to the Dominant Scenery Attributes	Stability ⁷ of the Dominant Scenery Attributes	Scenic Stability Level
LOW risk to ALL ⁸ (dominant and minor)	ALL are stable	VERY HIGH STABILITY
LOW risk to ALL (dominant)	ALL are stable	HIGH STABILITY
HIGH risk to a FEW	MOST are stable	MODERATE STABILITY
HIGH risk to SOME	SOME are stable	LOW STABILITY
HIGH risk to MOST	FEW are stable	VERY LOW STABILITY
HIGH risk to ALL	NONE are stable	NO STABILITY

Definitions of Scenery Stability Levels are included to help clarify the characteristics of the ratings.

VERY HIGH STABILITY – all dominant and minor scenery attributes of the valued scenic character are present and are likely to be sustained.

⁶ Ecosystem risk identifies the maximum (most severe) degree of risk to some of all of the dominant scenery attributes in the analysis area. For example, HIGH risk to a FEW means that 10-40% of all the dominant attributes are at high risk, while the remaining 60-90% ranges from NO risk to MODERATE risk.

The following ranges will be used:

- ALL = 90-100% of all dominant attributes
- MOST = 60-90% of all dominant attributes
- SOME = 40-60% of all dominant attributes
- FEW = 10-40% of all dominant attributes
- NONE = 0-10% of all dominant attributes

⁷ Stable refers to scenery attributes with MODERATE, LOW, or NO risk (HIGH) risk attributes are not stable.

⁸ This is the only box that considers both the dominant and minor scenery attributes.

HIGH STABILITY – All dominant scenery attributes of the valued scenic character are present and are likely to be sustained. However, there may be scenery attribute conditions and ecosystem stressors that present a low risk to the sustainability of the dominant scenery attributes.

MODERATE STABILITY – Most dominant scenery attributes of the valued scenic character are present and are likely to be sustained; a few may have been lost or are in serious decline.

LOW STABILITY – Some dominant scenery attributes of the valued scenic character are present and are likely to be sustained. Known scenery attribute conditions and ecosystem stressors may seriously threaten or have already eliminated others.

VERY LOW STABILITY – Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.

NO STABILITY – All dominant scenery attributes of the valued scenic character are absent or seriously threatened by their conditions and ecosystem stressors. None are likely to be sustained, except relatively permanent attributes such as landforms.

Scenery Attribute Risk Determination

The dominant vegetation types of ponderosa pine and mixed conifer have been identified as dominant scenic attributes.

Water form as defined for scenery management refers to surface water occurrence and characteristics (Forest Service 2000). Per the hydrology specialist report (Runyon 2013) “Watershed resources include those features where water is found either permanently (perennially), intermittently, or ephemeral at the earth’s surface including springs, ponds, wetlands, and stream channels as well as the watersheds that contain these features. It also includes ecosystems dependent on water resources such as riparian areas. The terms perennial, intermittent, and ephemeral are often used to convey information about the permanence of a water body.” No water form related attributes will be considered.

Rather than consider stream channels as water, they will be addressed under landform. Stream channels will be considered as a minor scenery attribute related to the potential risks associated with wild fire, intensive weather conditions (that could result in flooding), and damage to large watershed landscapes.

There are indirect actions that affect landform since changes are proposed in the road system. Landform is, typically a more stable attribute, roads will be evaluated as a minor scenery attribute as related to risks related to road construction, use of temporary roads and road decommissioning.

VEGETATION SCENERY ATTRIBUTES

NOTE: The detailed project information used in the analysis is based on information from the Silviculture, Fire and Fuels, and Soils/Watershed Specialist Reports. Refer to these for additional details.

Scenery Attribute: Reduce overall stand densities and moving stand conditions toward forest structures considered to be more typical of forest structure under pre-settlement fire regimes. Improve tree vigor and stand resiliency. Improve the diversity of age classes and structure of woody vegetation.

The Dry Lake Hills (DLH) portion of the project area is in the San Francisco Peaks Landscape Character Zone landscape character type. It is characterized by ponderosa pine, [mixed conifer⁹], and spruce-fir forests with inclusions of aspen adding variety to the landscape year round. Desired conditions would be to “move toward historic, pre-European settlement conditions. Forests would be characterized by uneven-aged groups of pines, widely spaced...” (Forest Service 2011). The desired condition for the mixed conifer landscape character type is to “reduce tree density, retain or regain species diversity including both early and late successional stages, and to re-establish and maintain openings...” (Forest Service 2011).

The Mormon Mountain portion of the project area is in the Ponderosa Pine landscape character zone. Vegetation is composed mostly of ponderosa pine forests, with this area being part of the largest contiguous stand of ponderosa pine in the world. Some mixed conifer forests with inclusions of aspen can be found on Mormon Mountain... (Forest Service 2011). Table 3 displays the vegetation cover types and quantities in the Dry Lake Hills and Mormon Mountain areas.

Table 3. Cover type and quantity in the Flagstaff Watershed Protection Project (Silviculturalist Report)

Cover Type	Dry Lake Hills	Mormon Mountain	Totals
Non-Vegetated			
Barren (Right of Ways)	33	0	33
Non-Forest Communities			
Grassland	60	0	60
Forest Communities			
Ponderosa Pine	4336	1924	6260
Mixed Conifer	3118	838	3956
Wet Mixed Conifer	0	213	213
Aspen	22	0	22
Total Forested Acres:	7476	2975	10451
Total Analysis Area Acres:	7569	2975	10544

Ponderosa pine - The ponderosa pine forest vegetation community within the project occurs at elevations ranging from 7,000 to 9,200 feet. It is dominated by ponderosa pine and includes other species such as oak, juniper. Small groups or individual aspen, Douglas-fir, white fir, limber pine and pinyon may also be present. The existing condition of the ponderosa pine forest is denser and more continuous than in reference conditions according to the silviculturist’s report.

The density of individual trees (as well as groups of trees in stands) and resulting competition affects the rate at which trees grow and stands develop. Lack of moisture, nutrients and sunlight effects growth rates and the ability of trees to move into the different size classes (Silviculturalist

⁹ Mixed conifer type added by author based on silvicultural specialist report (Stevenson 2013).

report). The measures are used to compare the existing and desired tree densities are vegetative stand structure and basal area for Dry Lake Hills and basal area for Mormon Mountain.

Using vegetative stand structural classifications, based on diameter size class in the DLH portion, more than three-quarters of the trees (outside of Mexican Spotted Owl forest habitat and goshawk nest stands) are in the 5 to 18 inch size classes. The remaining trees are in VSS 5 and 6. Table 4 provides the breakdown into size classes. The low representation in the seedling/sapling, mature and old classes indicates limited structural stage diversity across the landscape within the ponderosa pine.

Table 4. Vegetative Stand Structure (VSS) sizes and representation at Dry Lake Hills compared to forest plan desired conditions (Silviculturalist report).

Dominant Vegetative Stand Structure Class	Existing Forest Structure Outside Goshawk Nest Stands	Forest Plan Goshawk Nest Stand Direction	Existing Forest Structure in Goshawk PFA/nest stands
1 (0-0.9 inch) Grass/Forb/Shrub	0%	10%	0%
2 (1-4.9 inch) Seedling/Sapling	0%	10%	0%
3 (5-11.9 inch) Young Forest	32%	20%	41%
4 (12-17.9 inch) Mid-age Forest	53%	20%	40%
5 (18-23.9 inch) Mature Forest	8%	20%	0%
6 (24 inch plus) Old Forest	7%	20%	19%

*Outside of Mexican Spotted Owl forest habitat.

The ponderosa pine forests in the project area are much denser than historic conditions, with the average basal area of 132 ft² per acre outside of goshawk nest stands, and 137 ft² per acre within nest stands (Silviculturalist report).

At Mormon Mountain, the ponderosa pine is within Mexican Spotted Owl (MSO) recovery habitat. Much of the landscape has a closed tree canopy, dominated by a single canopy layer and one age class. The young and mid-age structural stages account for approximately 85 percent of the ponderosa pine analysis area while the grass/forb and seedling saplings stages are 0 percent, the mature tree stage is 6 percent and the old forest stage is 9 percent. The low representation in the seedling/sapling, mature and old classes indicates limited structural stage diversity across the landscape with in the ponderosa pine (Silviculturalist report). Current average basal area in recovery habitat nest/roost areas 173 ft² per acre in pine-oak stands at Mormon Mountain. The existing average basal area in recovery habitat foraging/non-breeding is 161 ft² per acre in pine-oak at Mormon Mountain.

Mixed Conifer – The silviculturist’s report includes the following information about the mixed conifer vegetation type. “The mixed conifer vegetation community within the project are occurs from 7,200 to 9,200 feet elevation. It is dominated by Ponderosa Pine, Douglas-fir, Limber Pine, and White Fir. Aspen is an early seral species and occurs frequently throughout the mixed conifer areas. Limber pine does not occur in the Mormon Mountain portion of the project.

Mixed conifer occurs in a continuum from warm-dry to cool-moist types. The most common species in the warm-dry type include ponderosa pine, Douglas-fir, white fir, limber pine, Gambel oak, and aspen, while the cool-moist types within the project area include white-fir, Douglas-fir, aspen, and maple. Warm-dry mixed conifer types tend to be on lower slopes or south facing slopes and are more open than the cool-moist types. Historically the warm-dry type experienced low to moderate intensity fire frequently. In the cool-moist types, fires were less frequent but generally of a higher intensity and severity.

In mixed conifer forest, habitat types are intermingled in relatively small areas, such as opposing aspects of the same hillside. Mixed conifer forests within the project are generally denser and more continuous than in reference conditions and accumulations of forest litter and woody debris are much higher than would have occurred under the historic disturbance regime. Lack of fire disturbance has led to increased tree density and fuel loads that increase the risk of uncharacteristically intense wildfire and drought-related mortality. When fires occur under current conditions, they tend to kill a lot of trees, including the large and old trees. These trees take longer to replace, moving the forest further from desired conditions, and increasing the time it would take to return to desired conditions. There is a high risk of insect and/or disease outbreak, which is also a function of increased tree density.”

Basal area in existing Mexican Spotted Owl recovery habitat nest/roost averages 145 in mixed conifer at Dry Lake Hills and in recovery habitat-foraging non-breeding mixed conifer it averages 142 BA at Mormon Mountain.

For the entire analysis area, the following table indicates the target basal areas based on proposed treatment type for Dry Lake Hills and Mormon Mountain.

Table 5. Target basal area* by proposed treatment type (Silviculturalist report).

Treatment	Dry Lake Hills	Mormon Mountain
Goshawk Nest Fuels Reduction	70	
Goshawk PFA Fuels Reduction	70	
MSO Nest Fuels Reduction (burn only)	N/A	110
MSO Nest Fuels Reduction (hand thin)	110	
MSO Nest Roost Recovery (hand thin)	95	
MSO Nest Roost Recovery (thinning)	N/A	95
MSO PAC Fuels Reduction	80	80
Mixed Conifer Fuels Reduction	60	
Ponderosa Pine Fuels Reduction	45	50

*Used for modeling

As noted in the silviculturalist report “Forest resiliency and diversity is dependent on the distribution of age and size classes. A balance of age and size classes across the landscape allows for a sustainable balance of regeneration, growth, mortality and decomposition”.

Currently, the project area lacks age and size class diversity and both even-aged and uneven-aged structure. A lack of age and size class diversity results in a homogenous landscape with reduced resiliency (i.e. much higher risk of high intensity and severity fire, density-related mortality, potential for insect attack, and dwarf mistletoe spread and intensification) and reduced understory diversity.

Ecosystem Stressors

High forest densities result in increased inter-tree competition, decreased tree health, growth and vigor, decreased regeneration of shade intolerant species, stagnation of structural stage progression, increased insect and disease-related mortality especially in older age classes, decreased horizontal heterogeneity, decreased understory productivity and diversity, and increased fire hazard (Silviculturalist report).

Historic patterns show that there were more and larger gaps in the canopy of the forest than are currently present. It is desirable to restore the open quality of the trees. Photo point comparison provides a good means of assessing change over time as shown in figure 2.



Figure 2. Historic photo of Mount Elden, ca 1890 compared to the existing condition in 2013.

Using guidance from Table 1, the vegetation scenic attribute is in **poor condition**. The stressors including lack of age and size class diversity and resulting decreased forest resilience, ability to withstand extreme weather events including drought, overly dense trees and lack of gaps between trees and groups of trees, lack of frequent low severity fires, and potential for insect attack are severe. Forest users viewing scenery enjoy the scenery in the existing condition, and may not understand that it is at risk. Following the Shultz Fire and subsequent municipal bond it is apparent that citizens of Flagstaff are concerned about the existing condition in Dry Lake Hills and Mormon Mountain. Movement toward the desired condition of “scattered groups of trees with grassy openings between that provide natural contrast and species diversity. A mosaic of openings and groups of trees allows existing scenic views and attributes to be seen.” Would improve views and the scenic quality of the areas. **This scenery attribute is at high risk.**

Scenery Attribute: Large, old age trees are well represented across the project area.

The ponderosa pine landscape character type has the desired condition of having large, older trees become a major component of the forest over time. This applies to both Dry Lake Hills and Mormon Mountain.

A review of silviculture data for this project shows that about five percent of the ponderosa pine and 35% of mixed conifer are classified in the old forest cover type (VSS 6 per table 4). The Coconino NF Management Plan (Forest Plan) direction is for a minimum of 20% allocated to old growth. Most sites currently do not fully meet the minimum criteria for ponderosa pine or mixed conifer old growth conditions as listed in the forest plan.

Ecosystem stressors include wildfire, insects and disease, and extreme weather conditions such as drought. The combination of both ecosystem and social concerns results in a high level of stress.

Using Table 1, **the scenery attribute condition is poor** because there is a known deficit in large, old trees in both the mixed conifer and ponderosa pine types. Ecosystem stressors include wildfire, insects and disease, and extreme weather conditions such as drought. An important conclusion from the forest aesthetic research that large mature trees are an important part of scenic beauty and should be retained in forest thinning projects (Ryan 2005). Scenery desired conditions also indicate uneven aged groups of trees – all age and size classes present, but distributed across the landscape in groups and clumps. Different sizes and forms create variety and pattern across the landscape that is characteristic of the ponderosa pine forest and is the dominant visual element. Uneven aged groups of trees are also desirable in the mixed conifer forests. **This scenic attribute is at high risk.**

Scenery Attribute: Much of the forest has open appearance of tree groups and openings making the forest more resilient to mortality from insects and disease. Per the silviculturalist report, “An outbreak of bark beetles, starting in 2002 to 2003, resulted in widespread mortality across Arizona, including mortality in the project area. The outbreak was primarily the result of several native bark beetle species responding to the weakened condition of moisture-stressed, over-crowded forests. Trees on stress-prone sites were most affected. A decrease in affected acres began to occur in 2007.” However more recent data indicates there is a high risk of outbreak.

The silviculturalist report notes “When trees are growing at high densities, there is a greater amount of inter-tree competition for resources like light, water, and nutrients compared with trees growing at lower densities. Research in the West clearly shows that when trees are stressed from overstocking they are more susceptible to bark beetle attack. During the recent landscape-level bark beetle outbreak in Arizona, elevation and tree density were significant variables for estimating the probability of occurrence of mortality in ponderosa pine stands on several forests. Dwarf mistletoe infection also appears to influence attack patterns of bark beetles on ponderosa pine during drought events”.

Use of the bark beetle hazard model for southwestern ponderosa pine and draft Ips hazard model indicates approximately 3 to 11 percent of the ponderosa pine analysis area has a low bark beetle hazard rating, while 13 percent of the area has a moderate rating and the remaining 76 to 97 percent has a high hazard of beetle attack (

Table 6). Mixed conifer ratings are noted below.

Table 6. Existing Ponderosa Pine Beetle Hazard Rating

Cover Type	Hazard Rating	Dry Lake Hills	Mormon Mountain
Pine	Low	11%	3%
Pine	Moderate	13%	0%
Pine	High	76%	97%
Mixed Conifer	Low	0%	27%
Mixed Conifer	Moderate	5%	0%
Mixed Conifer	High	95%	73%

Stevenson notes in the silviculturalist’s report “Dwarf mistletoes are the most widespread and damaging forest pathogens (disease-causing organisms) in the Southwest. Damage from dwarf mistletoes includes growth reduction, deformity—especially the characteristic witches’ brooms, and decreased longevity. Infected areas often have much higher mortality rates than uninfected areas. Infection is often a major factor in mortality attributed to other damaging agents. For example, severely infected trees are often attacked by bark beetles.

Southwestern dwarf mistletoe infection in ponderosa pine is common throughout the ponderosa pine analysis area. On both the stand and landscape level, the distribution of dwarf mistletoes is usually patchy, with more or less discrete infection centers surrounded by areas without the disease. Infection centers expand very slowly, so overall incidence changes little from year to year (USDA Forest Service 2011).” Table 7 provides information about the dwarf mistletoe infection level in the project area.

Table 7. Dwarf mistletoe infection levels in the Dry Lake Hills and Mormon Mountain areas (Silviculturalist report).

Cover Type	Infection Level		Dry Lake Hills	Mormon Mountain
Pine	None/Low	Percent of Area	37%	69%
Pine	Moderate/High	Percent of Area	34%	31%
Pine	Severe	Percent of Area	29%	0%
Mixed Conifer	None/Low	Percent of Area	80%	91%
Mixed Conifer	Moderate/High	Percent of Area	20%	9%
Mixed Conifer	Severe	Percent of Area	0%	0%

The condition of the **scenery attribute of resilience to insects and disease is poor**. Large scale tree mortality from insect and disease can be just as devastating to scenery as a high severity wild fire. While other consequences such as flooding may not be as destructive, the scenery would be changed for decades. The ecosystem stressors relating to insects and disease are high tree densities, and drought, subsequently there may be risk from fire. These are high stressors. **This scenery attribute is at high risk.**

Scenic Attribute: Reduce fuel buildup to help prevent the spread of wildfire onto private property and into drainages leading to the City of Flagstaff and its municipal watersheds and reservoirs. Reduce the risk for high intensity stand-replacing wildfires and reintroduce fire as a natural part of the ecosystem.

Thinning and introducing prescribed fire in the project area, especially in areas where fire hazard ratings are extreme to high and fire regime and condition classes are outside the natural range of variability would lower the risk of uncontrollable wildfire that would produce undesirable and perhaps detrimental effects to the ecosystem. These treatments would also help with reducing threats of wildfire to values at risk within and adjacent to the project areas, including the City of Flagstaff, surrounding communities, San Francisco Peaks, Kachina Peaks Wilderness and the Lake Mary watershed.

Fire has been excluded and/or suppressed from the project area for over 110 years. From the 1970s to present, wildfires have occurred on approximately 500 acres within the Dry Lake Hills and only 3 acres have occurred in the Mormon Mountain area in the last 20 years. Reforestation efforts in the early 1980s occurred after the Radio fire on top of Mt. Elden in 1977 but have largely failed.

Fire hazard ratings were calculated for the acres survey in the Dry Lake Hills (50% surveyed) and Mormon Mountain (93% surveyed) project areas. Fire hazard ratings measure how intense and virulent a fire would burn under hot, dry, and windy conditions during April through July. The results are shown in Table 7. Extreme fire hazard ratings in the project areas were attributed to high fuel loading, low crown base heights, a large number of trees per acre, and/or large percentages for canopy closure.

Table 7. Fire hazard ratings and acreages for surveyed acres in the project area (Fire and Fuels report).

Location	Fire Hazard Rating in Acres and Percent of Area				
	Low	Moderate	High	Very High	Extreme
Dry Lake Hills	100 (3%)	470 (12%)	613 (16%)	72 (2%)	2582 (67%)
Mormon Mountain	51 (2%)	174 (6%)	273 (10%)	197 (7%)	2089 (75%)

There are five natural fire regimes and are characterized based on average numbers of years between fires combined with fire severity of the dominant overstory vegetation. Within these it is possible to determine three different fire regime condition classes (I, II, III). Per the Fire and Fuels specialist report, “Fire regime condition class (FRCC) quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions due to an absence of fire and an increase in fire return intervals (Havelina et al. 2010). The deviation from the historic fire regime is measured according to the number of fire return intervals missed and the disturbance regime altered so as to alter current structure and composition of the system

outside the normal range of variation (LANDFIRE 1.1.0)”. Table 8 provides a description of the fire regime condition classes and potential risks associated with each class. In the Dry Lake Hills, 88% of the project is in Fire Regime I, Condition Class 3. At Mormon Mountain, 88% of the area is in Fire Regime I, Condition Class 3. The high vegetation departures are due to the fire return interval in the areas being greater than the historical fire return intervals. The deviation between the current and historical intervals has created existing conditions in both project areas favoring wildfire activity, if started, that would result in more severe effects to ecosystem components than should occur for the natural fire regime.

Crown fire potential was also analyzed for the project area. Three types of fires may occur. Surface fire describes fire that burns through the surface fuels of the forest floor. This type of fire has the least active of fire behaviors and is the most beneficial in maintaining the historical, ecological role of low intensity, high frequency fire in the southwestern ponderosa pine ecosystem. Passive crown fire, or torching, occurs when flame lengths are long enough to reach the lower edge of the canopy and can

Table 8. Descriptions and potential risks for fire regime condition classes.

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) are low Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate;
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components are moderate Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high

result in individual or small group tree torching but does not proliferate through the forest canopy through continuous crown fire spread. Active crown fire occurs when flames reach the forest canopy and spreads through it with intensity and continuity.

Two sets of weather conditions were modeled to provide crown fire potential. These weather conditions were used in modeling to give an overall worst case scenario in terms of crown fire potential. Both the 97th percentile conditions represent the top 3% worst fire weather days from 2002-2013, and Shultz Fire 89th percentile conditions. Table 9 presents the results of the crown fire potential modeling.

Table 9. Existing crown fire potential in Dry Lake Hills and Mormon Mountain at 97th and 89th percentile conditions (Fire and Fuels Report).

97 th Percentile Conditions	Surface Fire (percent of area)	Passive Crown Fire (percent of area)	Active Crown Fire (percent of area)
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Dry Lake Hills	19	8	73
Mormon Mountain	10	16	74
Shultz Fire 89 th Percentile Conditions			
Dry Lake Hills	39	10	51
Mormon Mountain	6	24	70

Since 67-75% of the project area (Dry Lake Hills and Mormon Mountain) have extreme fire hazard risks, most of the area is outside of historic fire history, and the potential for crown fire in both areas is 50-70%, the **scenery attribute condition is poor**. Crown fire usually causes 100% mortality and would negatively affect the scenic attributes. The higher than historic fire return level also indicates that high intensity surface fires could scorch tree canopies and cause additional mortality in as much as 80% of the area. The desired condition of fire evidence reintroduced as a natural element of the scenery in an irregular mosaic of burn patches and with maintenance burning that has low to moderate burn severity. Burning is essential in order to re-establish scenic stability. The ecological stressors of fire, high tree densities, drought and potentially more intensive weather events (wind, lightning, etc) are severe. **This scenery attribute is at high risk.**

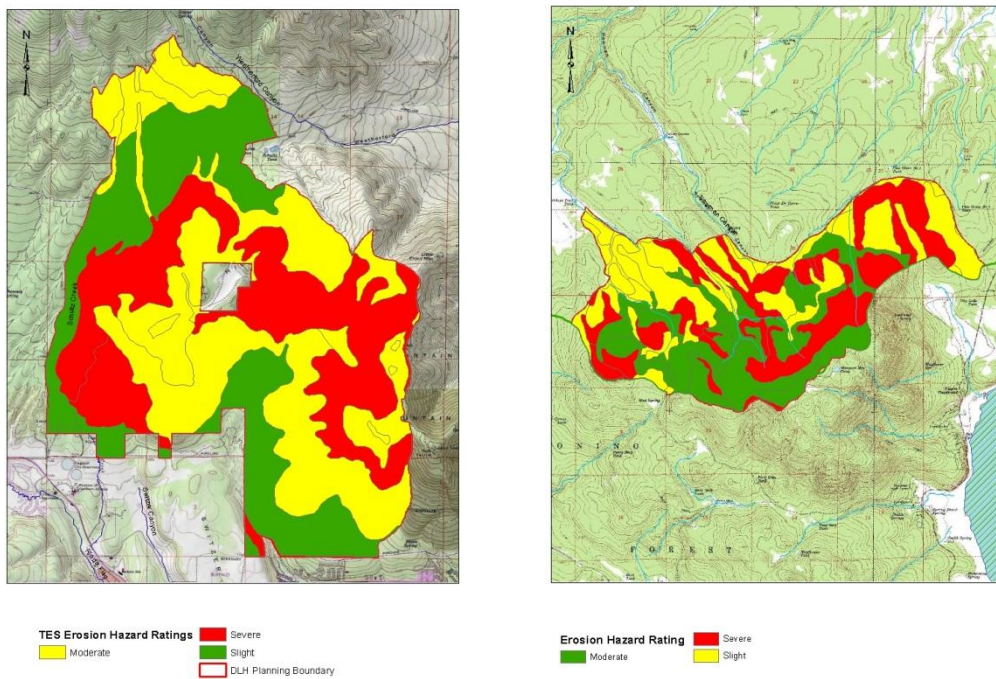
LANDFORM SCENERY ATTRIBUTES

Minor Scenery Attribute: Reduce overall stand density and improve understory vegetation, providing for stable landform especially stream channels.

The hydrology report for this project discusses the soil condition and related understory plant diversity. “TES map units and associated soils conditions within the DLH and Mormon Mountain portions of the analysis area are identified in Table 1 and 2. All TES map units within the entire analysis area are in satisfactory condition with the exception of TES map unit 55. This is generally attributed to high amounts of vegetative ground cover, including vegetation basal area and litter, which serves to protect the soil from raindrop impact and dissipate the energy of overland flow. Despite this overall rating, nutrient cycling within ponderosa pine and mixed conifer vegetation types has been observed to be less than satisfactory as a result of low understory species diversity. This low diversity of understory species is typically the result of a dense overstory canopy cover that limits growth of herbaceous plants.

TES defines erosion hazard as the probability of soil loss resulting from the complete removal of vegetation and litter. A slight rating indicates that all vegetative ground cover could be removed from the site and the resulting soil loss will not exceed "tolerance" soil loss rates. A moderate rate indicates that predicted rates of soil loss will result in a reduction of site productivity if left unchecked. A severe rating indicates that predicted rates of soil loss have a high probability of reducing site productivity before mitigating measures can be applied. Erosion hazard ratings are displayed in Figures 3 and 4.

The majority of soils in map units associated with the DLH analysis area have low soil erodability factors, however, many of these same soils are assigned moderate to severe erosion hazard ratings. This can generally be explained by the steep slopes since slopes have associated with map units in the DLH area. Slope has a strong influence on erosion since runoff velocity is directly proportional to slope gradient. The majority of soils associated with TES map units in the MM analysis area have moderate soil erodability factors. Map units with severe erosion hazard ratings are often found on steep slopes.”

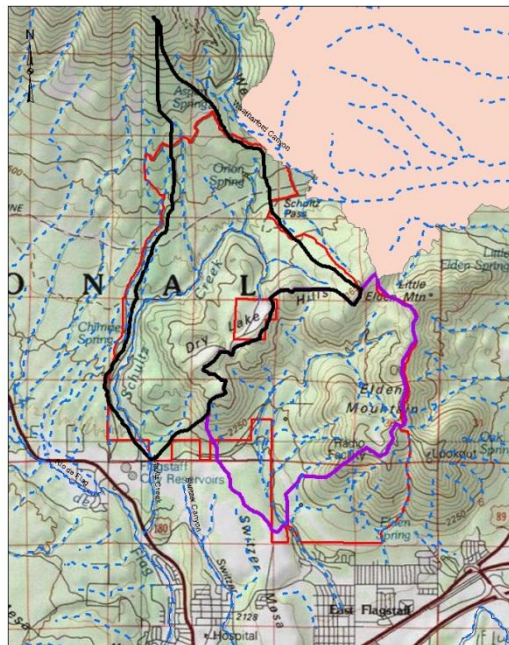


Figures 3 and 4. Erosion Hazard Ratings for Dry Lake Hills and Mormon Mountain (Watershed Specialist's report)

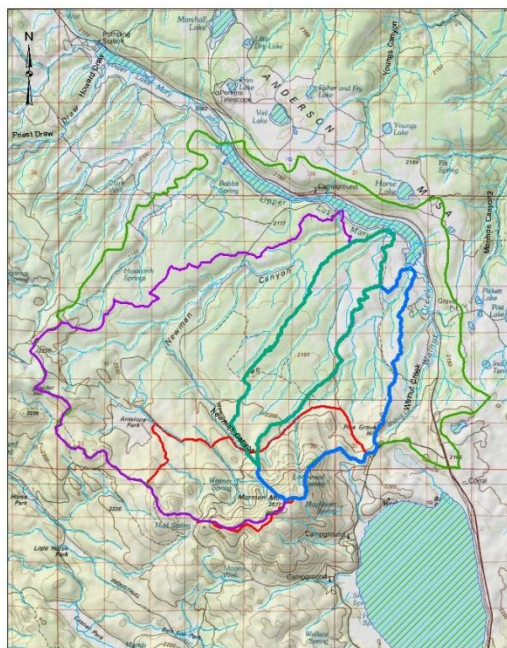
Sixty-seven percent of the Dry Lake Hills portion of the analysis area is in fire regime I, condition class 3¹⁰ and 75% of Mormon Mountain is the same. Per the watershed specialist's report "This high departure from natural (reference) conditions highlights the vulnerability of the catchments draining the analysis area to a fire that would likely greatly alter the catchment hydrologic response, rate of erosion, and sediment transport". As shown in figures 5 and 6, many drainages in the project area into nearby communities or municipal watersheds for communities.

Currently the scenery attribute is in poor condition. The Dry Lake Hills and Mormon Mountain landforms include steep hillsides/mountain sides and drainages that add complexity to the scenery in the project area. The land patterns and variety provide diversity in the relatively flat Coconino Plateau. Stream channels have the potential to provide more diverse vegetative understory if the tree density is reduced, and fire is reintegrated into the landscape. Stable stream channels can better sustain low to moderate disturbances and flooding is less likely. Environmental stressors include wildfire, insects and disease and subsequent flooding. Due to the high departure from the historic regime of vegetation, fuel, fire frequency, severity and pattern, and potential for insect and disease outbreaks, and subsequent potential for flooding, these stressors are high. **This scenery attribute is at high risk.**

¹⁰ Fire regime 1 is described as generally low severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replaces up to 75% of the overstory (Interagency Fire Regime Condition Class Guidebook September 2010). Condition class 3 indicates high departure from the natural (historic) regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern, and other associated disturbances.



- Schultz Fire
- Schultz Creek Watershed
- Spruce Ave Wash Watershed
- DLH Planning Boundary



- Middle Basin
- East Basin
- Newman Basin
- Walnut Creek_ULM Watershed
- Project Boundary

Figures 5 and 6. Streamcourses and drainage areas associated with Dry Lake Hills and Mormon Mountain (Watershed specialist's report).

Minor Scenery Attribute: Use of existing forest roads and temporary roads and avoid construction of new permanent roads will maintain the landscape character.

Transportation systems used under all action alternatives would utilize a combination of existing Forest Service system roads, Forest Service system roads that are relocated to reduce erosion, one decommissioned road that would be converted to a system road, new temporary roads and temporary roads that would be placed on existing road prisms. Roads that are no longer needed for management of national forest lands would also be decommissioned under this EIS.

The Coconino National forest is concurrently conducting an environmental analysis of non-motorized recreation for trails, special uses and facilities in the Mt. Elden-Dry Lake Hills (MEDL) area. Much of MEDL planning area overlaps with the FWPP project area. There is the possibility that new temporary roads constructed under the FWPP could at a later time be converted to recreational trails. The EIS currently being prepared for FWPP will not analyze for the possible environmental effects of any future road to trail conversion within the project area. It will only analyze for the construction, use and rehabilitation of new temporary roads, not their possible conversion to a trail. If any road to trail conversion is considered under the MEDL environmental assessment, those environmental effects would be analyzed under the MEDL environmental assessment.

In the FWPP project, three roads (about two miles total) would be partially relocated for use as haul routes for log trucks and eliminate overly steep grades. The unused road prisms would be restored. Following project implementation, these roads would be closed with limited Forest Service administrative use only. Approximately 17 miles of forest system roads open to public use in the project area would be used as haul routes. In addition, just over 1 mile of closed forest system roads would be used. Up 18 miles of temporary road would be constructed, depending on the alternative. Some temporary roads would use existing road prisms, others would be newly constructed. All temporary roads would be restored following implementation. Over 4 miles of other roads found in the area would be decommissioned.

The desired condition for restored roads is to have soils in satisfactory condition so that the soil can resist erosion, recycle nutrients, and absorb water. Understory species (e.g., grasses, forbs, and shrubs) diversity would be consistent with site potential and provide for infiltration of water and reduction of accelerated erosion. The forest system roads (and associated drainage) would be maintained during implementation and the contractor is also responsible for a final road maintenance and drainage action upon project completion. The open road system receives maintenance on a scheduled basis as determined by the roads engineers and for specific projects.

The scenery attribute condition for existing roads is strong, and they are at low risk because they receive regular maintenance as part of the designated system of roads. Scenery attribute condition for temporary roads is fair, and stressors are moderate. Since temporary roads will be restored, their condition would improve upon project completion. Ecosystem stressors include wildfire and intensive weather events, these have moderate stress on these attributes. **The scenery attributes of proposed roads are at moderate risk.**

SCENIC STABILITY DETERMINATION

Of the scenery attributes evaluated for the existing condition, five are at high risk and one is a moderate risk as shown in table 5.

Table 5. Summary of risk rating.

Factor	Risk Rating for Existing Condition
Tree density, improvement of age class diversity and structure of woody vegetation	High risk
Large, old trees are well represented across the project area	High risk
Resilient to mortality from insects and disease.	High risk
Reduce fuel build up, risk of high intensity wildfire is reduced and fire is reintroduced into the ecosystem	High risk
Minor Attribute: Reduce overall stand density and improve understory vegetation, providing for stable landform especially stream channels.	High risk
Minor Attribute: Use existing forest roads and temporary road for project implementation.	Moderate

Referring to Table 2 footnotes, this would mean that there is HIGH risk to MOST (60-90% of dominant attributes) and FEW are stable. This fits into the VERY LOW STABILITY level, most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.

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